

The Iron Age

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Published every Thursday Morning by DAVID WILLIAMS, No. 83 Reade Street, New York. Entered at the Post Office, New York, as Second-Class Matter.

Vol. XXXII: No. 23.

New York, Thursday, December 6, 1883.

\$4.50 a Year, Including Postage.
Single Copies, Ten Cents.

Improved Wire-Rope Attachments.

A simple, but very useful, invention has lately been brought out in England which may ultimately come into considerable use among miners. The invention consists in an improved method of fastening together wire rope. An old form of fastening was the use of conical thimbles in which, after the end of the rope was inserted, the diameter was conically increased by bending the wires, by driving spikes into the core of the rope, or by casting hot metal round it; in other cases the ropes have been pressed together by bolts and nuts, eccentrics, levers, &c. All these arrangements allow a more or less axial strain to take place, and have the defect of weakening the rope chiefly, and in the greatest degree, at the entrance to the thimble; and, therefore, some of the wires at this place are quickly destroyed, nipped off, or worn through successively. Also in the old modes of splicing, &c., the success depends on the skill of the workman, and even when most skillfully performed the rope suffers a great deal, because through untwisting and otherwise dealing with the rope the positions of the wires and strands to each other are altered, and, therefore, the attachment of the same becomes unequal. Casting hot metal round the rope has the defect of altering the nature of the material.

It is to avoid and remove these defects that the patent-rope attachment has been designed. It consists principally of a conical shell or thimble provided with a hook, loop, &c., and of toothed wedges, which take up and compress the rope between them, and which automatically fasten the same, the compression of the rope corresponding to the tension. The wedges surround the rope and exert upon it a pressure concentrically, which increases the adhesion and friction, and prevents all dislocation of the threads or wires, so that the whole of the wires equally participate in holding the load. The wedges are provided with teeth on the inside, which indent the body of the rope. No damage or injury to the threads or wires can arise, because in consequence of the resistance elongation cannot take place, and the natural breaking of a rope can only arise after the limit of elasticity has been reached. As, however, the useful resistance—that is to say, the friction, &c., between wedges and rope—have to be greater than the dynamic resistance (resulting from the friction between the back of the wedges and the inner surface of the thimble), if a sliding forward of the wedges takes place and the attachment of the rope be firm, such a construction of the teeth is required as permits the use of conical wedges of such a taper as not to exert an excessive pressure on the rope, and also thimbles of very small substance. And, lastly, the wedges have a greater amount of concavity than the thimble, and the length and thickness of the teeth decrease as they are further from the actual joint, so that the bite upon the rope gradually increases from almost nothing, until, steadily increasing, it reaches its maximum near the end of the rope.

The method of fixing is extremely simple. The end of the rope is pushed into the thimble from the lower part; then on each side of the thimble a wedge is inserted from the top end, and driven in by a few blows with a hammer; the further tightening the wedges in a self-acting manner as soon as the load is put on the rope. In order to keep the wedges in their proper place, a cotter pin is pushed through a hole at the side of the thimble. When wishing to loosen or detach the rope, a few blows on the loop of the thimble will suffice to make the wedges come up. It is claimed that these improved rope attachments are equally well adapted for metallic or hemp ropes, as well as for flat and round mining ropes, and for tension bars in roof constructions they have proved very efficient.

A New and Economical Belting.—A foreign exchange reports that the latest patent in bands used for machinery is one for an invention by which it is claimed the only good belt made of textile fabric can be produced; it is not affected by change of temperature, stretches very little, is thoroughly waterproof, is as durable as leather, and being without the objectionable joints and splices of a leather belt, it runs straighter and truer. The belt is made solely of the best Russian flax, and in price is from 25 to 60 per cent. cheaper than leather belting. The unusual strength of the belting results from its being folded somewhat peculiarly, and which also accounts for its stretching so little. It is rendered water-proof by an entirely new process known only to the Russian Government, the peculiarity of which process gives it a marvelous grip of the pulley, and, no matter how long the belt is used, this never leaves it. The flax belt has been in use in Russia for more than two years and a half, and it has given the greatest satisfaction.

A Stone Bridge Over the Mississippi.—A recent dispatch from St. Paul, Minn., reports the completion of the first and only stone bridge built across the Mississippi River. It is the St. Paul, Minneapolis and Manitoba Railway Viaduct, spanning the river just below the Falls of St. Anthony. It is a massive stone structure, stretching to the east across the river, curving at first slightly to the left, and then running at right angles to the stream, directly to the east side landing,

the whole course being 2100 feet. The upper surface of the bridge presents to the view a smooth stone roadway, carrying a double track, walled in on either side by heavy blocks of stone, high and strong enough to prevent a train from leaving the bridge, even should it be derailed. The viaduct crosses the river with 23 arches, 16 of the spans being 80 feet each. The material is granite and magnesian limestone. The width is 28 feet over all, and the height from the springing point of the arches to the top is 50 feet 6 inches. The cost of the bridge was \$990,000.

Bridging the English Channel.

One of the latest of the many wild schemes which are continually proposed, but never executed, is that of forming some solid means of communication between France and England. The tunneling of the English Channel, which has for some half a century occupied the attention of the inhabitants of the adjacent countries, seems in a fair way to be superseded in the minds of certain enthusiasts by a truly magnificent—but, it is to be feared, impracticable—scheme which has been devised by M. Vêrard de Sainte-Anne, for a railway

over-water communication. M. Vêrard intends to submit his calculation to the revision of an international commission of engineers, so that the scheme may be freed from all elements of uncertainty. He will then ask her Majesty's Government to "promote in Parliament the necessary bills for the construction and working of the line."

Railway Accidents in Great Britain.

In the general report presented to the British Board of Trade on the railway accidents that occurred in the United Kingdom in 1882, it is stated that the total number of persons returned to the Board of Trade as having been killed in the working of the railways during the year was 1121, and the number of injured 4601. Of the above number, 127 persons killed and 1739 injured were passengers; but of these only 18 were killed and 803 injured in consequence of accidents to or from collisions between trains; the deaths of the remaining 109 passengers killed and injuries to 936 were due to a variety of other causes, but more especially to a want of caution on the part of the individuals themselves. Of the remainder, 553 killed and 2576 injured were officers or ser-

The Emery Testing Machine.

In our article on "Emery Scales and Testing Machines," published in last week's issue, we undertook to give the reader some idea of the means which Mr. Emery employed in indicating loads or strains of all descriptions with an accuracy hitherto unknown. Most of our readers are perfectly familiar with the very accurate work of the Watertown testing machine. In our last article we gave in a brief manner the details of the systems employed and the method of operation. How a system of diaphragms can be applied to the weighing of the work of a testing machine we shall attempt to explain here, and also to show what means the designer has adopted to obtain a machine entirely free from back-lash when the specimen breaks. As shown in Fig. 1, it will be seen that the apparatus consists of two parts. The first is the machinery for putting strain upon the specimen, whether of compression or tension. In the engraving the machine is shown exerting a transverse strain on an I-beam. In its essential features this apparatus consists of two screws carrying a straining beam, to which a hydraulic cylinder is attached. This

ferent from anything of which we have any account, and adds very materially to the ease and speed of weighing. One of the features which not only in chemical, but also in large balances, is inherent in Mr. Emery's system of weighing, is the fact that the motion of the load is so small and the consequent momentum so insignificant, that the beam or pointer can come to rest quickly without a long series of vibrations on each side of the zero.

In order to enable the reader to understand the construction of the apparatus, we have had a drawing made of the base of the machine and framework (Fig. 5), with portions broken away to show the more important features. Bearing in mind that whether the strains be those of tension or compression—that is, whether in an upward or downward direction—they must result in compressing the liquid in the pressure support, the reader is prepared to understand the method of operation. The resistance, or the final abutment, is found in the frame F, which is of cast iron and very heavy. This frame surrounds the two beams E E, which constitute the bed and platform of the scale, and between which is placed the hydraulic pressure support. When the strain takes an upward direction these pieces are forced against the upper member of the frame. When the pressure is downward they rest on the lower portion of this frame. They have between them, in the pressure support, a pair of diaphragms inclosing a quantity of fluid, which, by means of the slender tube f, communicates with the pressure column of the weighing apparatus. These pieces E E are surrounded by a yoke, B D C D, in which they are perfectly free and with which they have no rigid connection. The strain of the load is taken by this outside yoke entirely, and through it communicated to the abutment pieces E E. These two pieces, with the diaphragm between them and its inclosing rings, are finished to such a thickness that they just fill the space between the two members of the frame to within, say, $\frac{1}{16}$ inch. This is the maximum amount of motion which is permitted. Having this arrangement of yoke and abutment pieces, it becomes necessary to hold it in position and prevent it from any lateral motion, and at the same time allow it perfect freedom in a vertical direction. This is accomplished by a most ingenious modification of the flexible plate or metal fulcrums. For example, the upper beam E E is held and supported in position and prevented from side motion by the thin bars b b. The vertical motion is so small that the elasticity of these spring bars b b allows it to rise and fall with practically no friction.

Similar flexible bars c c, support and fix in position the lower scale beam E against horizontal motion and allow freedom of motion vertically. The yoke is in like manner firmly fixed against horizontal motion at its top and bottom by four pairs of spring plates, two of which, a a and a' a', at the top, are attached at right angles to each other to the upper beam A B of the yoke and to the frame F, while the other two pairs at the bottom c c and c' c', also at right angles to each other, are fixed to the lower beam C of the yoke, and to the frame F. They allow perfect freedom in a vertical direction, while compelling the whole movable portion to work in a vertical line. A beam G, is bolted to the bottom beam C of the yoke, and has its two ends extended between two pairs of initial load springs marked d d. The yoke B C D D and its contained scale beams E E being suspended in the air by the six pairs of fixing springs, as before mentioned, is now carried firmly against the beam E E by the full pressure of the load springs d d by means of two pairs of screws not here shown, one pair of screws acting to apply the load of these springs d d in an upward direction, and the other in a downward direction. When these springs are made to bear upward against G, the yoke is resting against the lower scale beam E, transmitting the load of the springs d d through the pressure support to the upper beam E, which now becomes the bed of the scale, with its outer ends resting against the frame F at the top, while the lower beam E acts as a free platform, and the scale is then balanced ready for use with strains of tension. If strains of compression or transverse loads are desired, the load springs d d are made to act downward on the beam G, the upper beam E now acting as the free platform, and the lower beam E as the bed of the scale. The acting area of the diaphragm in this apparatus, where a strain of 75 tons is to be exerted, is 13.6 inches in diameter.

As shown in Fig. 1, the testing machine is arranged for transverse strains. This is accomplished by putting a heavy bar across the top of the table A, which carries at its two ends suitable supports with hemispherical bearings on which the specimen rests. The outer ends of these bars are supported by braces, one of which is shown in Fig. 1. The lower ends of these braces enter the slot shown near the base of D in Fig. 5. Immediately under the ram is shown a gauge for reading the deflection. The cross-head which carries the hydraulic ram is arranged in a very neat, but somewhat peculiar, manner. It is carried by two screws, the nuts of which have, both above and below, a pair of gear-wheels. A pair of intermediate gears transmit the motion from one to the other,

(Continued on Page 5.)

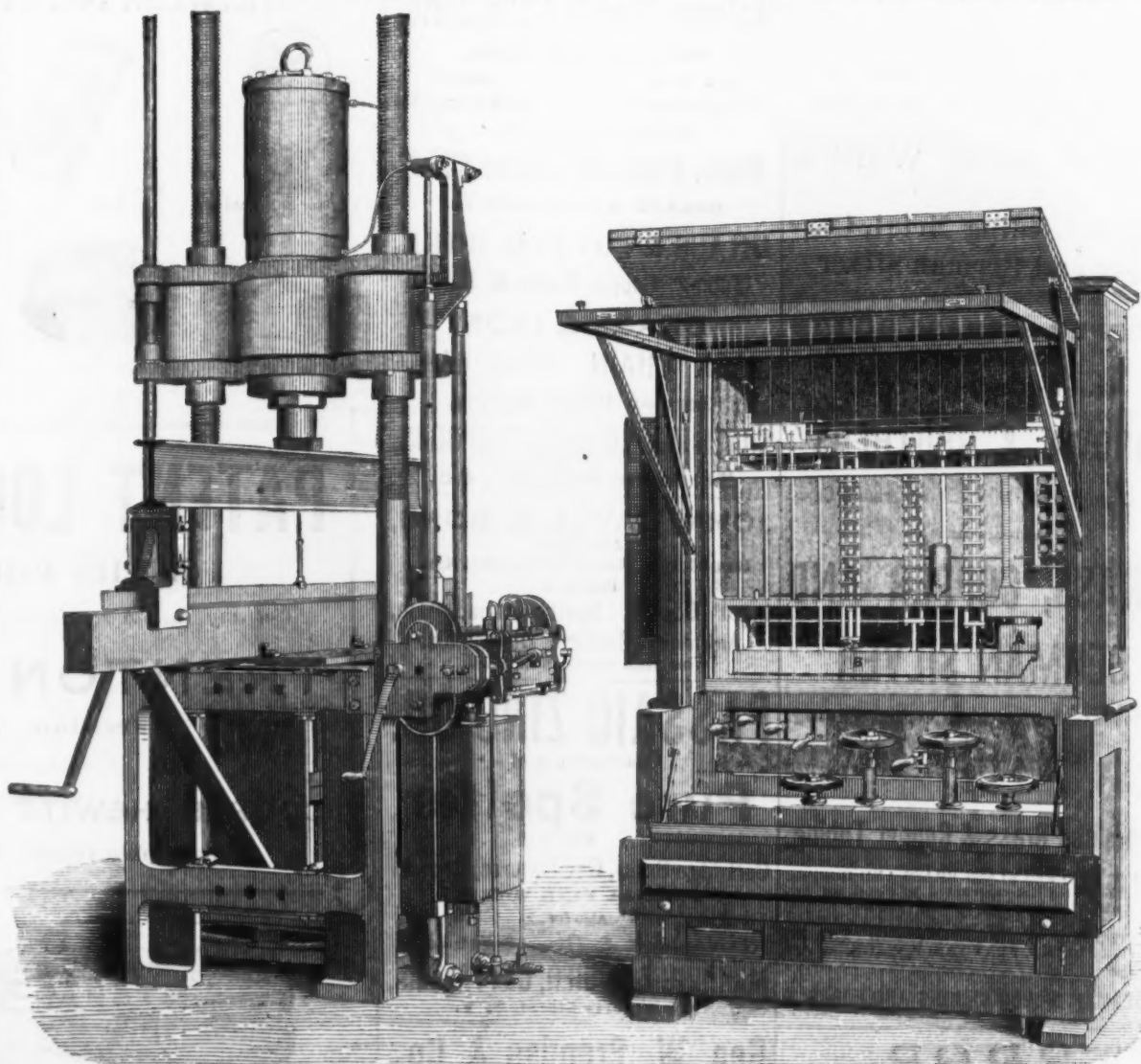


Fig. 1.—Elevation of the Machine.

Fig. 2.—Scale Beam and Case.

EMERY TESTING MACHINE, BUILT BY YALE & TOWNE MFG. CO., STAMFORD, CONN.

bridge between Folkestone and Cape Grisnez. The plan provides for a series of bridges constructed on varying principles, so as to allow for the passage at certain points of vessels with the tallest masts, while, of course, preserving as nearly as possible a level road for the line. The center supports are designed to rest on the Varne and Colbart rocks, the former serving also as a basis for a solid pier surmounted by a hotel. M. Vêrard de Sainte-Anne professes to have made the most careful soundings, and is convinced that the channel bed affords a firm basis for the numerous piers, about 30 in all, necessary to support his main structure. In the absence of fuller details it is impossible to say how he proposes to carry out his idea, or at what cost, but the depths and currents have been carefully studied, as well as the probable interruption of the work by violent storms, while the expense has been estimated on two systems involving the employment of stone-work or metal. M. Vêrard estimates that the mail train would take about an hour and 35 minutes in passing over the bridge. In a letter to Mr. Gladstone on the subject the designer states he is convinced that sooner or later England and France will be connected by some such scheme as that he proposes, and which he maintains is more feasible than the projected tunnel, which has given rise to so much apprehension. While he stoutly repudiates any intention on the part of France to ever again entertain any aggressive or unfriendly designs toward England, he points out that all fears on that score may be set aside, because, in the event of this bridge becoming *un fait accompli*, a little dynamite would in a few seconds entirely destroy the

vanta of the railway companies or of contractors; 441 persons killed and 286 injured were trespassers, suicides and others, who met with accidents at level-crossings or from miscellaneous causes. In addition to the above, the companies have returned 42 persons killed and 4367 injured from accidents on their premises which cannot be considered as "railway accidents," as they were not connected with the movement of railway vehicles. The total number of passenger journeys, exclusive of journeys by season-ticket holders, was 654,838,295 for the year 1882, or 32,678,295 more than in the previous year. Calculated on these figures, the proportions of passengers killed and injured during the year, from all causes, were, in round numbers, one in 5,156,207 killed, and one in 377,135 injured. In 1881 the proportions were one in 5,760,746 killed and one in 335,577 injured. The proportions, however, of passengers returned as killed and injured, respectively, in 1882, from causes beyond their own control was one in 36,379,995 killed, and one in 815,489 injured; while in 1881 the proportion was as high as one in 27,050,034 killed, and one in 630,354 injured.

According to the forestry bulletins, there were but about 82,000,000,000 feet of merchantable white pine standing in 1880 in the lumber States of Michigan, Wisconsin and Minnesota, and only about 35,000,000,000 long-leaf pine in Florida, Georgia and the Carolinas. But the estimate of long and short leaf in Alabama, Mississippi, Louisiana and Arkansas was above 134,000,000,000 feet, and this reserve has scarcely been touched yet. Louisiana alone has 48,000,000,000 feet standing.

cylinder furnishes the power for compression or extension. These screws are attached to a frame in which a pair of beams are placed to furnish the abutments for resisting the power. Whether the strain is tensile or compressive, it results in compressing the liquid in the hydraulic support between these beams, which constitute alternately the platform and bed of the scale. The second part of the apparatus of the weighing mechanism comprises a system of levers and a scale beam with suitable weights, and a pressure column with its diaphragms, to which the pressure exerted in the testing machine is transferred by a suitable tube. The liquid in the support between the beams, being compressed, is forced against the pressure diaphragm of the pressure column. The amount of force exerted here is then weighed, and the indication read from the scale beam and the pointer which is attached to it. The reader should bear in mind carefully the distinction between the two pieces of apparatus. One is in and of itself essentially for testing. It gives no indications of the amount of strain applied, and is a perfectly independent and disconnected apparatus. The other is an indicating mechanism, and might be adjusted to a platform scale, a weighing lock, a track scale, or, in fact, to a thousand and one other uses if necessary, its office being solely to register or indicate the amount of force exerted upon the system of levers which it contains. Although resembling to a certain extent the ordinary scale beam, it differs not only in the nature of its connections, but also in the method of putting on and taking off its weights. This feature alone is entirely dif-

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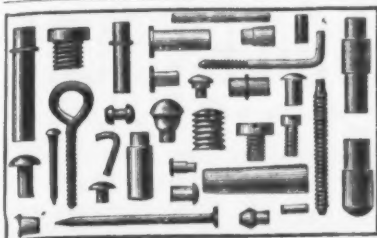
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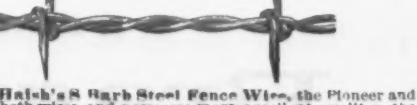


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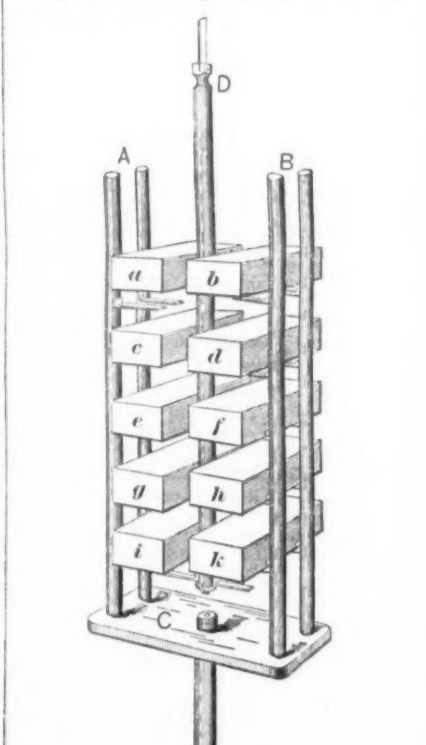
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(Continued from Page 1.)
and the whole is moved up and down by
means of a crank at the left hand of the
machine. This crank, through a pair of
bevel gears, works the vertical shaft on the
left-hand side with its two pinions, thus re-
volving the nuts. The shaft is provided
with the usual slot and feather. This makes
the matter of adjustment for different
length of specimens comparatively easy,
and, at the same time, simple. The cyl-
inder is a double-acting one, and is
connected with the force-pump by means
of two telescopic tubes, shown at the
right-hand side, and connecting with the
cylinder itself by small bent copper pipes.
These telescopic tubes are arranged in such
a way that no changes in the connections



Emercy Testing Machines.—Fig. 3.—St. ending Rod and Large Weights.

are needed in any part of the stroke. For
extension a peculiar form of jaw screws into
the bottom of the piston-rod or ram, and
also into a hole in the beam A. B. Fig. 5. The
weighing mechanism itself consists of a weight
beam, somewhat similar to that shown in
Fig. 6, with its indicator-rod and a series of
suspension-rods for carrying weights. This
beam in the scale shown is not connected
directly to a pressure column, but is moved
by a large steel beam 25 inches deep by
10 inches in width, pivoted with plate ful-
crums and moved by a pressure column
shown at A in Fig. 2. Just above the block

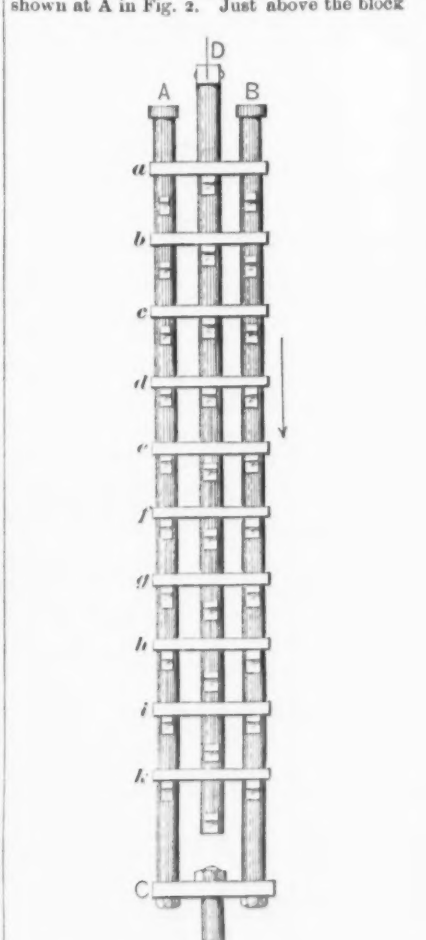


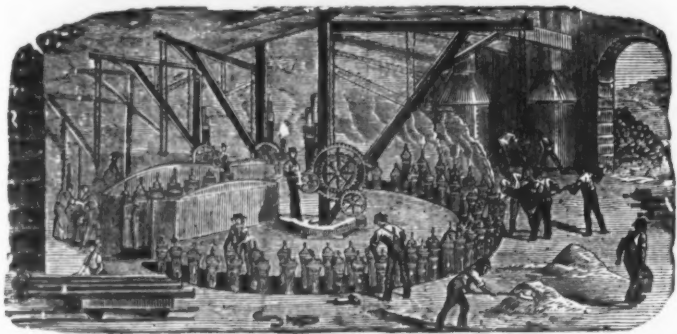
Fig. 4.—Suspending Rod and Weight.

A is shown the case containing the small
pressure chamber which is connected with
that in the support between the scale beams
E. E. The acting area of this small pres-
sure chamber in this machine is 1/2 that of the
large one, so 20 pounds on the platform A of
the yoke gives 1 pound on the column A of
the scale beam B in Fig. 2. The method
by which weights are put on and taken
off is in this case so entirely novel and
different from anything that has been
employed in ordinary weighing machi-
nes that we give it in detail. Fig. 4, on
a large scale, shows the weights with
their rod. The rod D carries on its front
side a number of lugs, and is supported by a
plate from the beam, the suspension spring
being shown at the point marked D. The rods
A and B also carry on their faces a number
of lugs, and are supported by the cross-head
C attached to one end of a rod which is oper-
ated by a lever below; a, b, c, k are the
weights. The problem is to successively
throw these weights upon the beam. This

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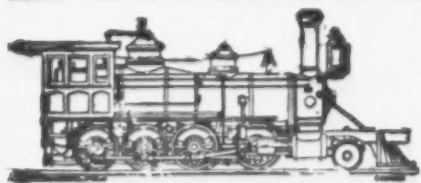
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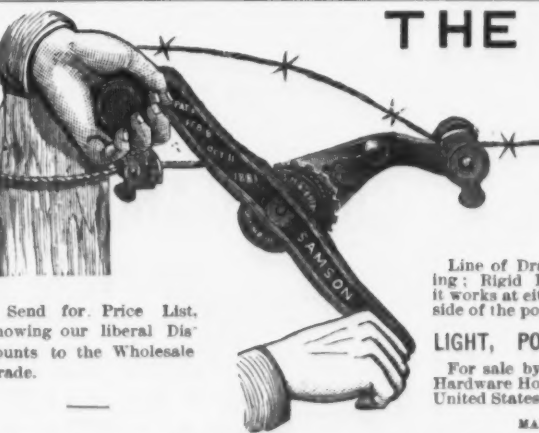
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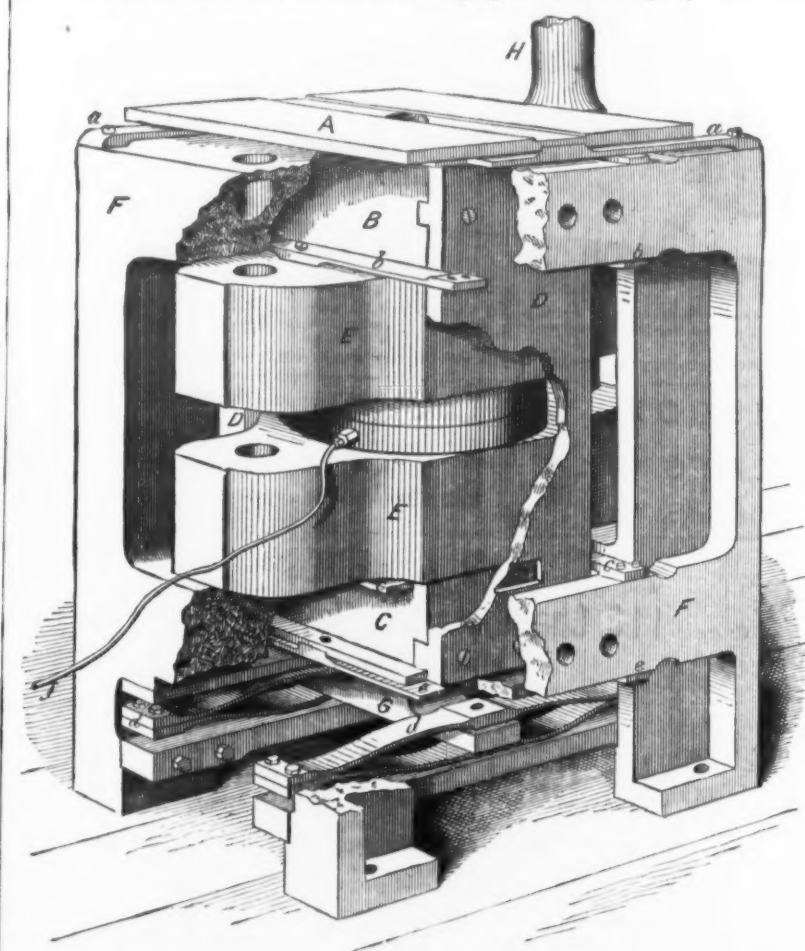
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is accomplished by a downward movement of the rods A B. The lugs not being evenly spaced, this downward motion brings the top weight A in contact with the uppermost lug on the rod D. If the motion is continued, B is next dropped on the rod, and C follows. In the engraving, a, b, c have already been left by the downward motion of A B on the rod D. The weight d is bearing not only on the center, but also on the side rods, and any further downward motion of A B would allow it to rest upon D. The other weights would be in succession deposited on the central rod by a continuance of the downward motion. On the front of the beam there are three sets of these rods, each one of them carrying a carefully adjusted set of weights, 10 in number. When all of one set are upon the beam the next

Railway Signals.

The following is an extract from an address delivered at a recent meeting of the British Association for the Advancement of Science:

When railways were first opened they were worked without any fixed signals, unless a candle placed in a station window on the Stockton-Darlington line may be so designated. The candle indicated that the train was to stop for passengers, and no candle implied no stoppage. No practical steps were taken toward the adoption of fixed signals till the opening of the Grand Junction Railway in 1838. The signal then used consisted of a disk fixed to a spindle with a handle to turn it, with a lamp at night to assist the purpose of the disk by day. This was a



Emergy Testing Machines.—Fig. 5.—The Base Frame and Abutments.

set is added, and so on, gradually increasing the weights until the limit of capacity is reached. The weights are arranged to add tens, hundreds and thousands of pounds to the balancing load. At the outward end of the beam, however, it is desirable to put on still greater weights, and Fig. 3 shows how these large weights are arranged. As in the previous case, there are 10 of them, but they are carried by two sets of rods fastened to the cross-head C. The rod D has arms projecting from it. One pair of these arms is shown at its bottom just below the weights i and k. By the lowering of A B, the weight a is first picked up by the rod D, then B follows, and so on until all are carried by D. When the cross-head C is raised the weights are lifted from D in a reverse order. In the front of the

more danger and safety signal. In the same year Sir John Hawkshaw designed a disk signal attached to movable rails for the Manchester and Bolton Railway, which was set in motion by a handle with a balanced weight attached, so that when the switches were opened to the siding, the face of the disk was presented; and if the switches were open to the main line, the side of the disk was presented. As the number of junctions increased it became apparent that not only must separate signals be given for different lines, but that some kind of concurrent action must be secured between signals and switches, to prevent accident. Now in long glass houses, built high above the line at important junctions, are long rows of levers. It is with these handles that the signalman inside the glass house sets the

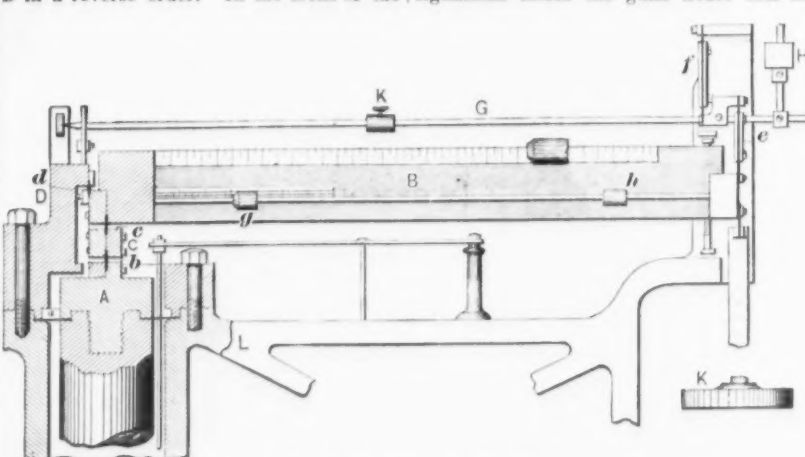


Fig. 6.—Beam for Platform Scale.

case which covers the beam four handles are seen. These handles, by motion up and down, move, by means of levers, the weight frames and put on or take off the weights. At the same time they raise or lower a series of pointers, and thus indicate just how many weights have been placed on the beam. In starting to weigh, all the handles are moved so as to bring the pointers at zero.

Steel Chains.—Experiments are now being made at the Washington Navy Yard in the manufacture of 1 1/2-inch steel chain to take place of the 1 1/2-inch iron chain now in use. The difficulty heretofore encountered in manufacturing steel chain was the trouble experienced in welding it. The naval authorities have, however, succeeded in getting a quality of steel from Pittsburgh adapted to welding, a section of chain made from it having been tried recently in the testing machine and found satisfactory. A quantity of it will soon be issued to the United States vessels on the home stations and subjected to a practical test, and, if satisfactory, will probably be generally introduced in the navy.

semaphore in motion, and, at the same time, opens the points to direct the train on to a particular line, and, perhaps, simultaneously close or lock the points of a branch line, thereby preventing the possibility of a second train coming on the line previously occupied. When the lever is once drawn over, a mechanical contrivance called a locking-bar prevents the points being moved until the whole of the train has passed. In fact, with the present apparatus for signaling, the number of trains that may be worked on a line of railway with perfect safety is enormous, and may be said to have reduced the element of human fallibility to as low a point as human ingenuity is capable of compassing. Audible signals are in use only in foggy weather, and the detonating signal, designed by Mr. E. A. Cowper in 1841, continues to be generally employed in this country for that purpose.

An Electric Railroad on Mt. Desert.—The parties who own the railroad up Green Mountain on the Island of Mt. Desert, in Maine, propose building a railroad for summer pleasure travel on the island from Bar Harbor to Eagle Lake, where connection will be made with the steamboat running across the lake to the terminus of the Green Mountain Road. The distance is three miles. It is proposed to use an electric motor for running cars on the new road.

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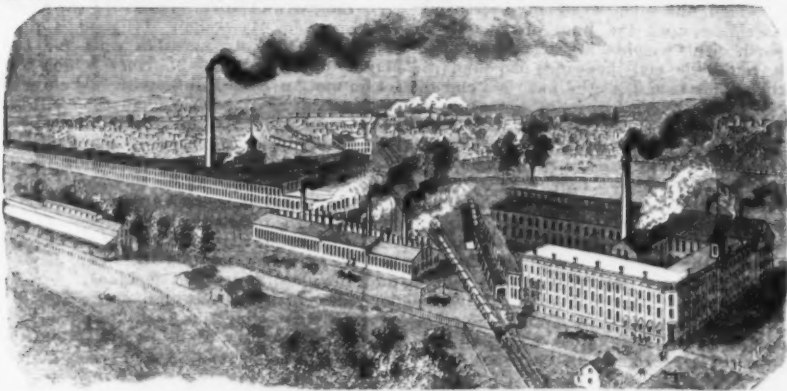
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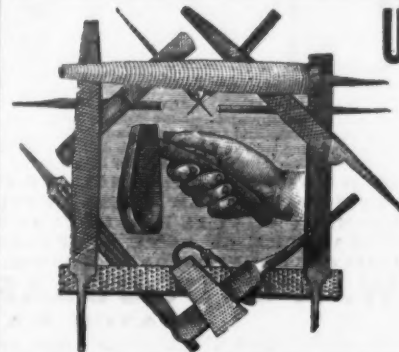
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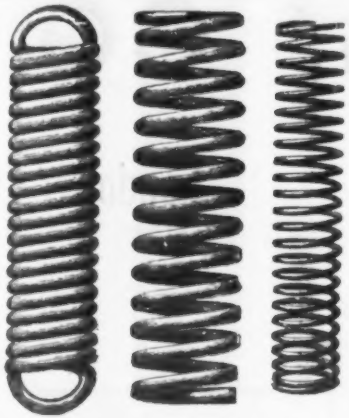
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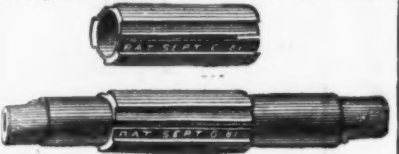
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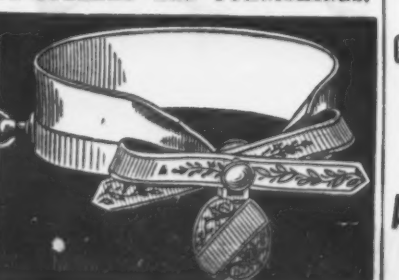


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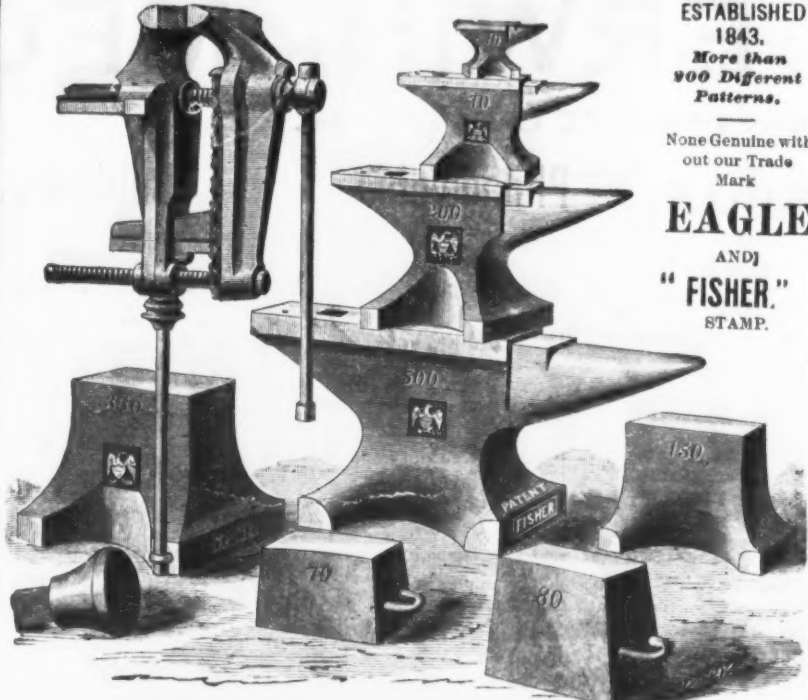


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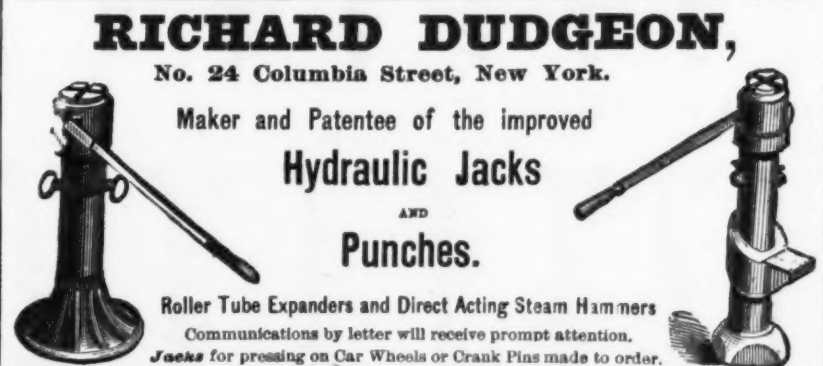
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The Completion of the Arlberg Tunnel.

The Arlberg Tunnel, which ranks only after the Mont Cenis and Mount St. Gothard tunnels among great engineering works of its class in Europe, was completed on the 14th ult. Its construction presented no extraordinary engineering difficulties. The construction of the stretch between Landeck and Bludenz has been much more difficult and costly. It is a mountain line from first to last. In the valley of Rosanna the gradient is 1 in 40. The road crosses the valley of Panzau on a viaduct of three arches, each having a span of 107 feet. The length of this stretch is 35 miles, and the total estimated cost 11,784,000 florins, or \$5,892,000.

At St. Antoine, 1721 feet above Landeck, is the beginning of the great tunnel which has just been completed. The work of boring began on the Austrian side in June, 1880, and in September operations were begun on the Swiss side of the mountain. The work proceeded at a speed which affords a striking illustration of the improvements that have lately been effected in the art of mountain tunneling. The Mont Cenis Tunnel was bored at the rate of 3637 feet a year, and the St. Gothard at the rate of 5474 feet, and the Arlberg was pierced at the rate of 7080 feet a year. The Arlberg engineers also profited by the experiences of their predecessors in the matter of cost, for while the outlay on the Mont Cenis Tunnel was \$2000 per running meter (39 1/5 inches), and on the St. Gothard \$1250, the expense of making the Arlberg did not exceed \$750 the meter. In this regard, however, the tunnel last named benefited by its shortness, since the longer the tunnel, other things being equal, the greater is its relative cost.

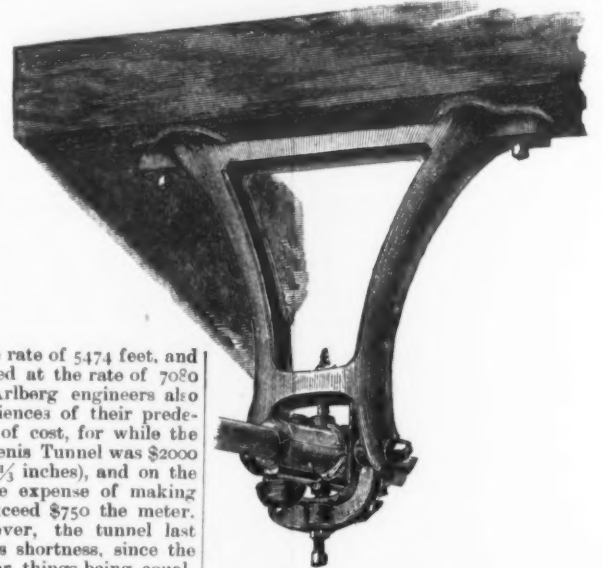
An interesting experiment was made in the Arlberg Tunnel with a new sort of perforator. The perforators used in the Mont Cenis and St. Gothard tunnels consisted of a series of chisels (not diamond-pointed, as has sometimes been stated) driven with a quick, hammer-like action by compressed air, the machines for the production of which were actuated by turbines at the two ends of the galleries. This system was the one in use on the eastern, or Austrian, side of the Arlberg. The chisels cover a space of 7 sq. m., and make 20 to 25 holes at one time, each from 1 1/2 to 2 m. deep. These are then filled with dynamite and the mine exploded. Every blast lengthens the drift by about 1 1/4 m. The perforators move forward on wheels, and the air, compressed to a pressure of five atmospheres, is supplied through flexible tubes. On the west side drills are employed of a diameter of 70 mm., 2 1/4 inches, to which, by means of a water pressure of from 60 to 100 atmospheres, a rotary movement is communicated. Six or eight of these drills are as effective as 20 or 25 of the atmospheric ones, and the holes they make are so much wider that equal results are produced with lighter charges of dynamite.

The greatest difficulty in Alpine tunneling consists less in quarrying out a passage than in getting rid of rubbish. After every blast the loose material must be removed before boring operations can be resumed, and when an atmosphere already close and impure is still further fouled by the smoke of an explosion, the labor of removal becomes dangerous, as well as difficult. The important part which the removal of rubbish plays in these undertakings is shown in the fact that of the time required for the making of the Arlberg Tunnel fully one-half was devoted to the carrying away of loose material. It must, however, be a long time before this tunnel can be utilized for traffic purposes, for, even

seen a large augmentation in the tonnage, with the one striking exception of 1877, when there were only 5627 tons, against 21,346 in 1876. In the following year, however, the increase continued, the tonnage reaching 26,660, and in 1882 it was 40,097. Even this latter figure, the highest of any previously recorded year, will be largely surpassed this year, as, during the six months ending June 30 last, 51 iron and steel vessels had been built, having an aggregate of 55,079 tons.

Self-Adjusting Hanger.

The accompanying engravings represent the Universal shafting hanger, manufactured by Messrs. Durkee & Keffer, proprietors of the Chicago Shafting and Pulley Works, corner Clinton and Monroe streets,



Self-Adjusting Hanger.—Fig. 1.—Hanger Arranged to Use Against Ceiling.

Chicago. The design of the inventor in the position of this hanger has been to devise such a form that the general features of construction might be incorporated in the hangers adapted for use in various positions. Our illustrations show three applications of this hanger, one being from the ceiling, another in the form of a bracket, and the third resting upon the floor. The special feature of the hanger is the use of an open yoke carrying the boxes the use of which permits put-

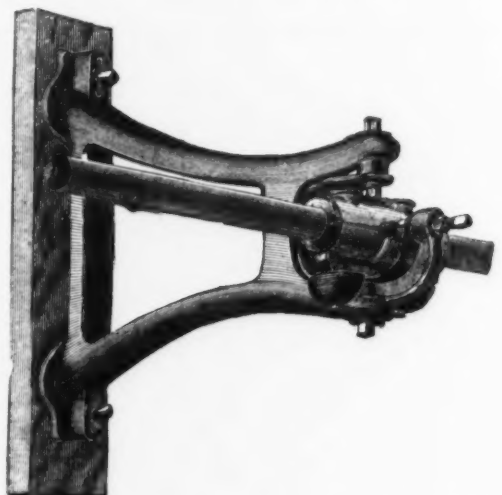


Fig. 2.—The Hanger in the Form of a Bracket.

ting up or taking down the shaft without removing the hangers. The boxes have a vertical adjustment of 2 inches, and are so mounted in the hanger as to adjust themselves freely to the shaft in any direction. In this respect the manufacturers claim for them that they possess freedom of movement not attained in the common belt socket hanger, owing to the fact that the belt socket bearings are rough, unfinished cast-

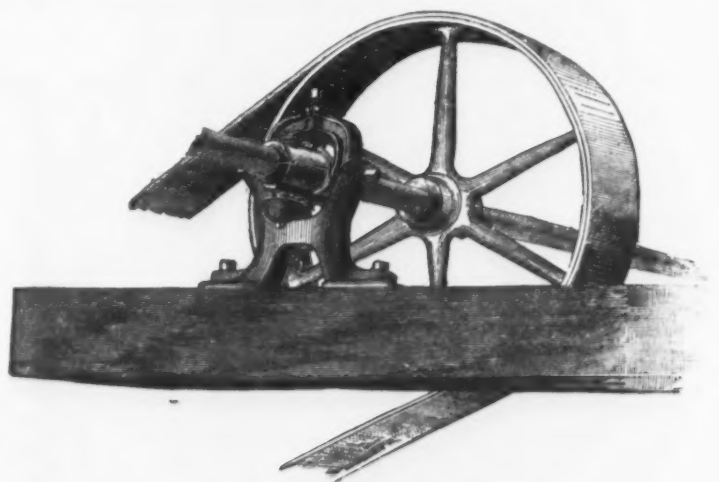


Fig. 3.—Floor Support for Shafting.

after the main task is completed, the approaches have still to be made, and a hundred difficulties overcome, such as those which interfered with the utilization of the St. Gothard. Once completed, however, it will afford a quick route from Switzerland and France to the western provinces of Austria.

Recently published statistics reveal the fact that the building of iron and steel ships is largely and steadily on the increase in the United States. Since 1863, when the total tonnage of the new ships of this class was 2801, to the present time every year has

ings, while the boxes in the hangers herein illustrated are pivoted on small machine-finished points, so arranged that very little strain comes directly on them. The oil chamber is provided in the bottom of the box, and the oil is fed by a cotton wick. These hangers are superior in neatness and convenience and have maximum strength. The large seat base gives them the bracing resistance which renders them capable of withstanding the strain of the heaviest belts and pulleys. The manufacturers inform us that they furnish these hangers with arms for ship rods where they are required for counter-shafts with tight and loose pulleys.

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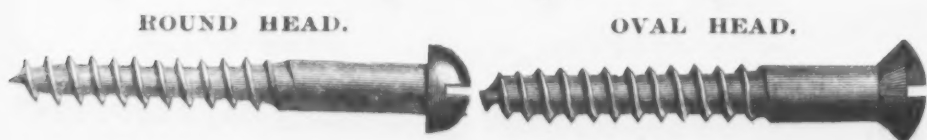
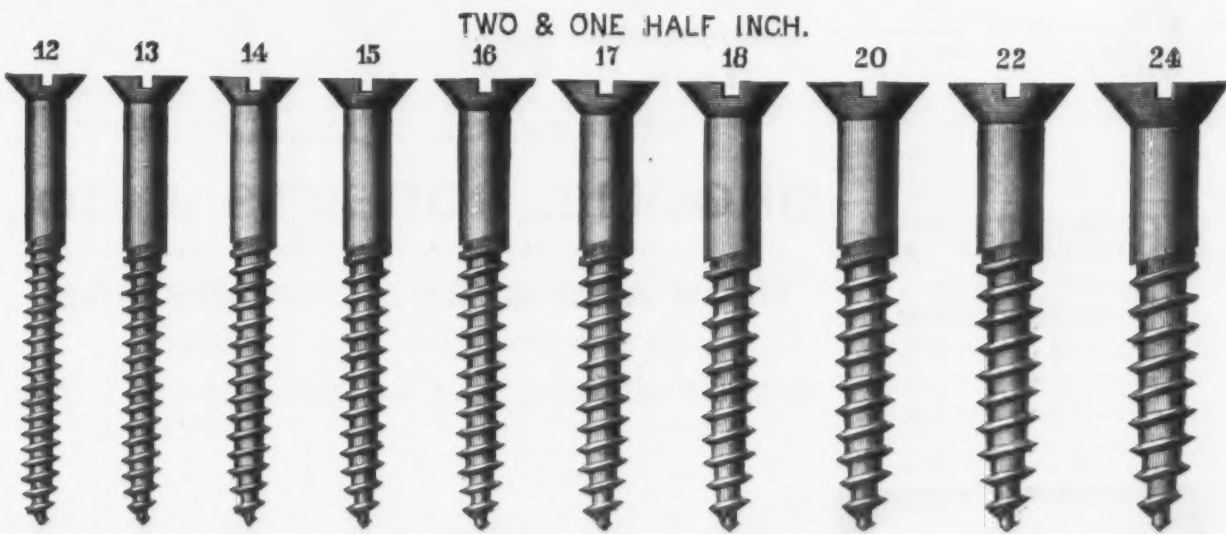
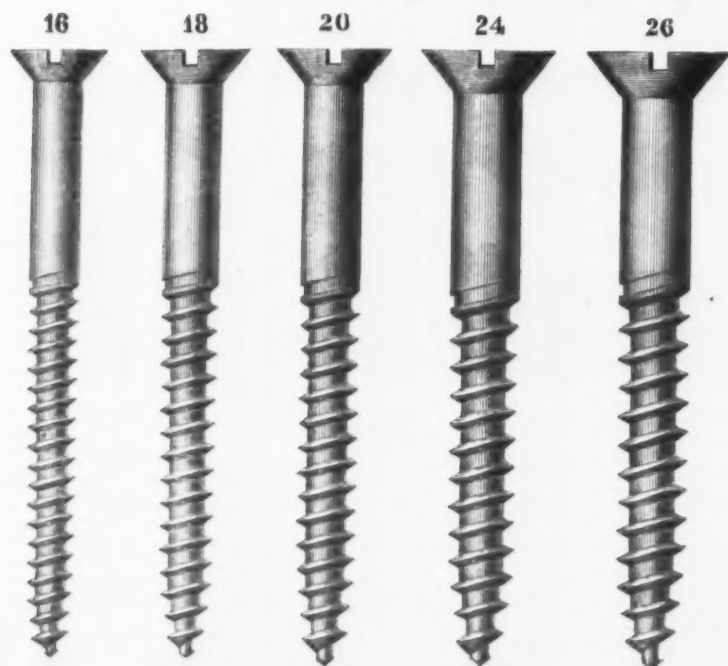
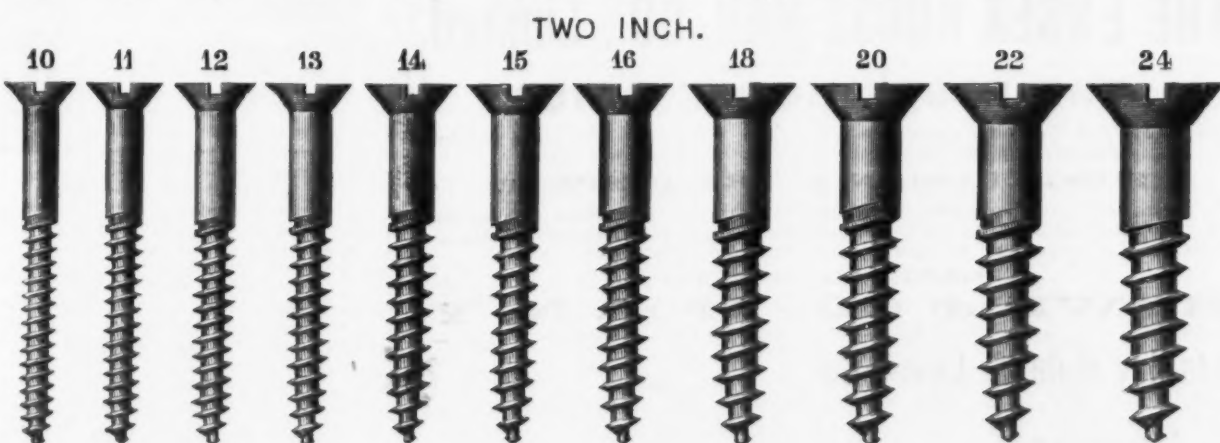
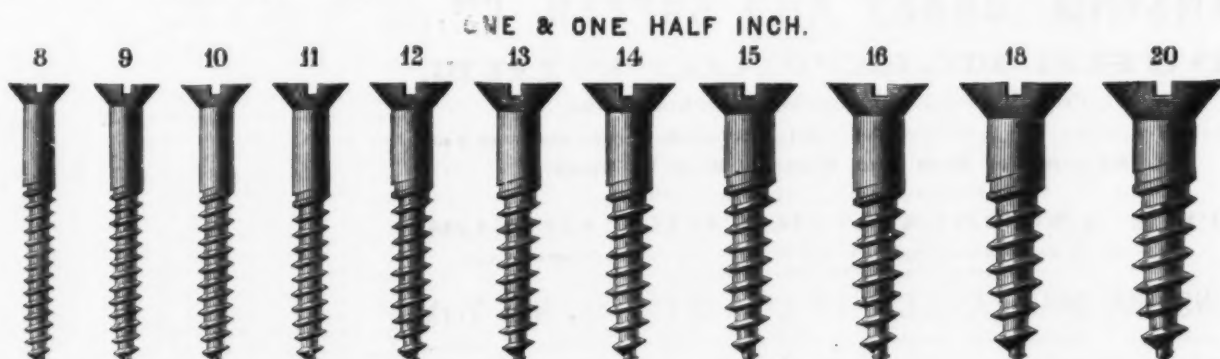
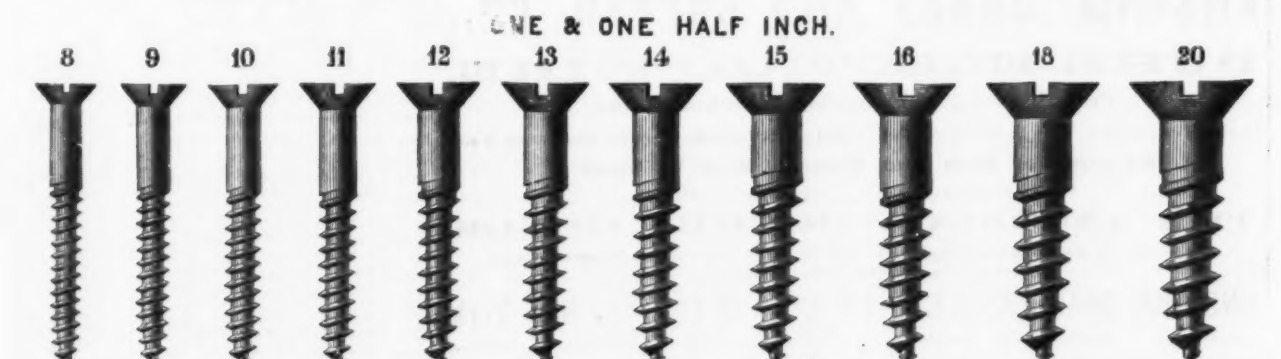
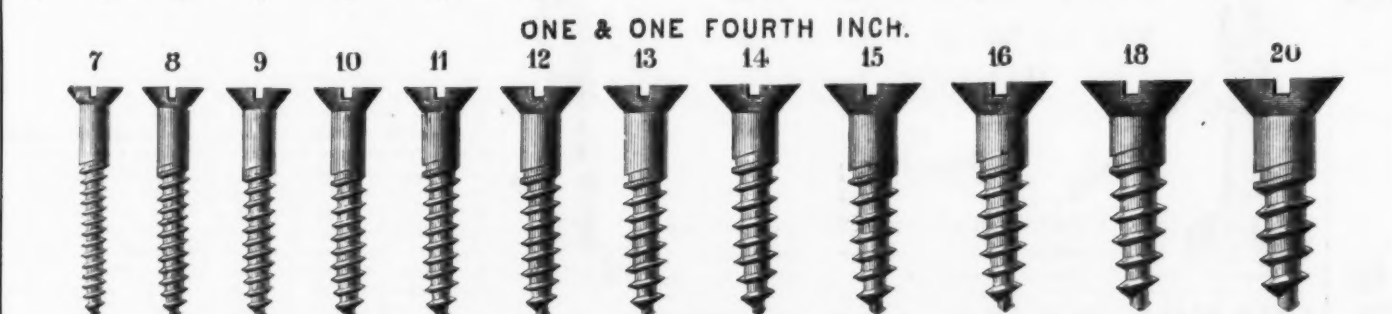
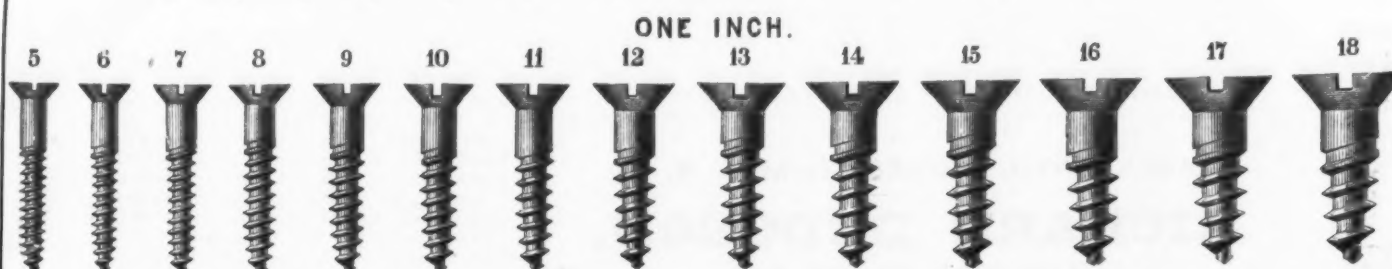
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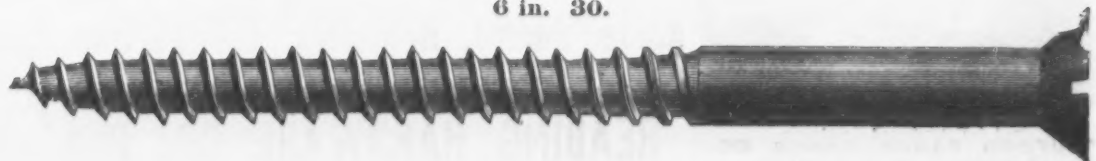
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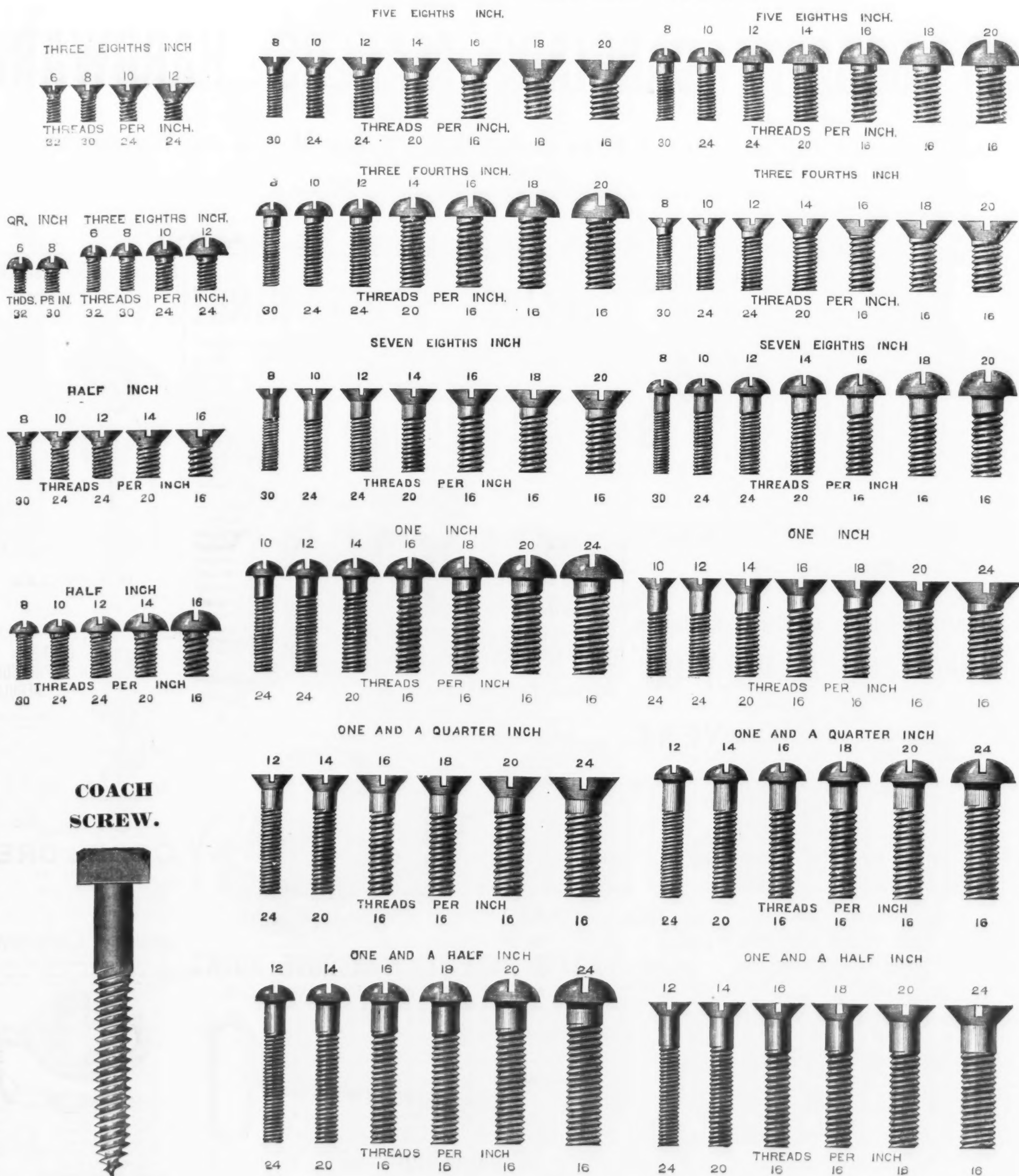
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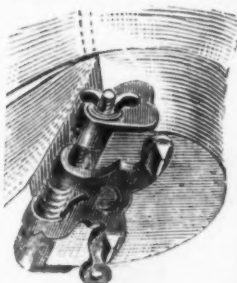
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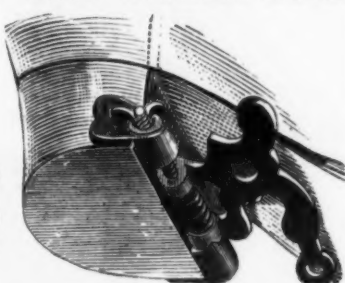


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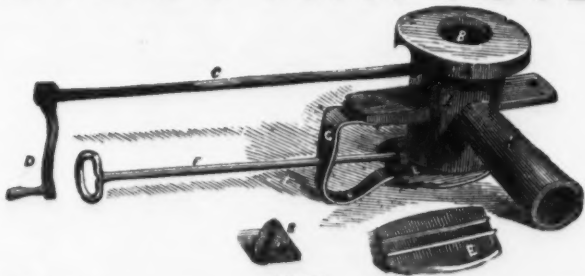
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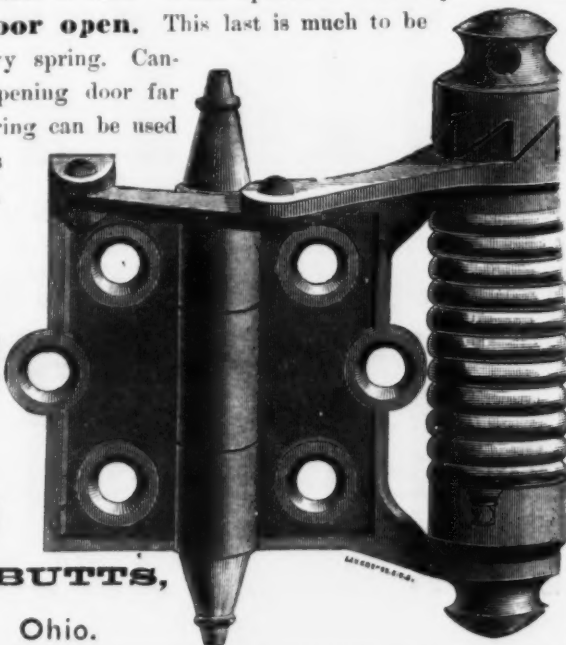
Has more good features than any other. Hinge part strong as a common butt. Loose wrought-iron pin. Knuckles milled and drilled. Exerts greatest force when door is shut. When opened somewhat past the center, holds the door open. This last is much to be desired. Extra heavy spring. Cannot be injured by opening door far back. Hinge and Spring can be used on medium size doors as well as screen doors.

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PATENTED,
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FROM

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We wish to give special attention to making Cast Steel Rolls of all sizes, Mill Gearing wherever Cast Steel is suitable. Also Cranks, Cross Heads, Shafts, &c., for Steam and Blowing Engine construction.

Being desirous of securing a share of public patronage, we will endeavor to make our product equal in quality to any in the market.

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PITTSBURGH, PA.

The Common Sense Sash Holder and Lock Combined.

Patented March 6th, 1883.



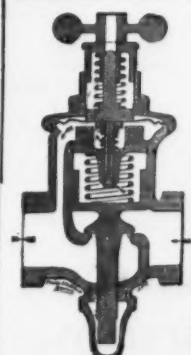
Is the best, cheapest
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Sash Holder and
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and we think as
the largest sale. It
holds the window at
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from rattling.

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REGULATOR,

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STEAM AND WATER,
is made entirely of metal
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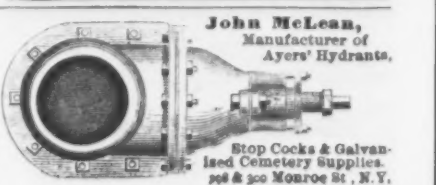
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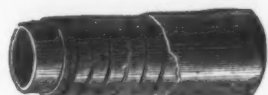
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This company manufactured the immense DRIVING and ELEVATOR BELTS for the Buckingham Elevators at Chicago, which have been running perfectly for more than twelve years, also those for the great Elevators of the Penna. and Erie Railroads, of Jersey City and Hoboken, Dow's Stores, of Brooklyn, and many others; in fact, the largest Belts for the largest Elevators in the world. A single carrier belt in the Penna. R. R. Elevator is over 200 feet long, weighing 18,000 pounds, and has run perfectly from the start.

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Circular Woven-Seamless Antiseptic RUBBER LINED "CABLE" HOSE and "TEST" HOSE, Vulcanized Para Rubber and Carbolized Duck, for the use of Steam and Hand Fire Engines, Force Pumps, Mills, Factories, Steamers, Ships, Hospitals, &c.

Pat. July, 1874.



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LARGE WHEELS MADE ON CAST-IRON CENTER IF DESIRED.

The properties of these Wheels are such that they can be used with great advantage and economy for cutting, grinding and finishing wrought and cast iron, chilled iron, hardened steel, slate, marble, glass, etc. These wheels are extensively used by manufacturers of Hardware, Cutlery, Edge Tools, Plows, Saws, Shovels, Fire Arms, Wagon Springs, Axles, Skates, Agricultural Implements, and small Machinery of almost every description.

Pat. Jan. 20, 1869.

PATENT ELASTIC Rubber Back Square Packing.

BEST IN THE WORLD.

For Packing the Piston Rods & Valve Stems of Steam Engines & Pumps. It represents that part of the packing which, when in use, is in contact with the piston rod. A the elastic back which keeps the part B against the rod with sufficient pressure to be steam tight, and yet creates but little friction. This Packing is made in lengths of about 20 feet, and of all sizes from 1/4 to 2 inches square.

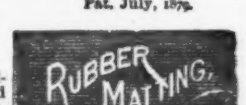
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This practical and indispensable article—especially for wear where exposed to ice, snow or slush—was first introduced by this company several years ago, and its real value is in being almost indestructible, when proper materials are used in its manufacture, whilst the cheap inferior quality forced on the public by reckless imitators of our patent goods soon becomes brittle and crumbles to pieces. Address



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JOHN H. CHEEVER, Treasurer.

Pat. 11,208, 213,601

Pat. July, 1879.

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A New Lever Press.

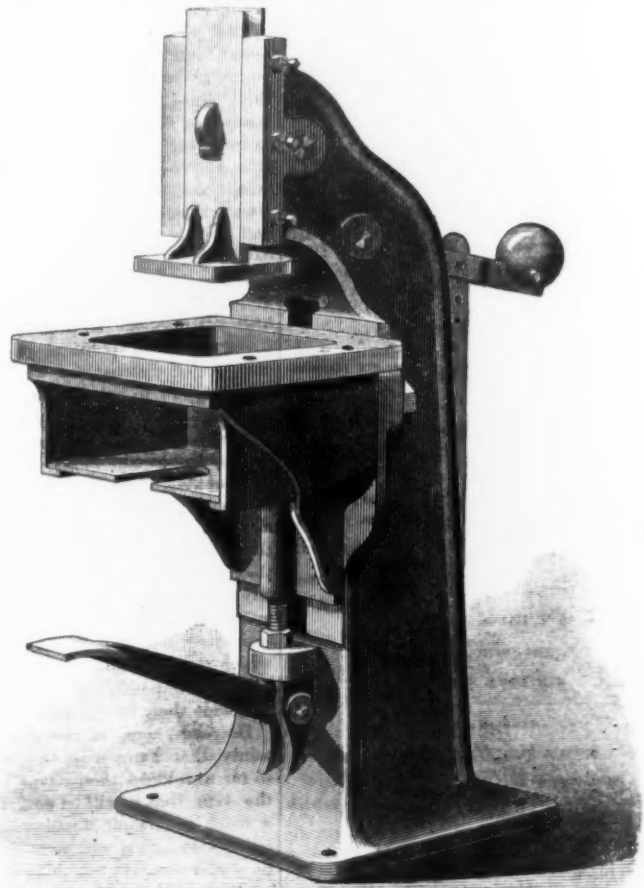
Our engraving represents a new pattern of lever press, built by E. W. Bliss, Plymouth, Pearl and John streets, Brooklyn, N. Y. A full line of sizes of this style of press is being put on the market. The largest will have an opening in its bed of 16 by 22 inches. As will be seen by a glance at the cut, the design is a very radical departure in style of framing and bed from anything that Mr. Bliss has yet turned out. First and foremost to be noticed is the adjustable bed, which moves up and down in guides on the front of the bed-plate, and is adjusted and held in any position by a heavy screw. This feature fits the press to receive dies of greatly varying height, and at the same time enables a most accurate adjustment of the die to the stroke of the press to be made. An intermediate lever between the mandrel lever and the treadle connection is introduced, which is connected with the mandrel by a toggle joint. This joint straightens at the end of the stroke, and the maximum power is exerted at the moment when the dies come together. Beneath the bed there is a slide plate for catching the blanks which pass through the dies, a feature which will be appreciated by a large number of manufac-

to over \$214,000,000. Our exports have increased under our protective system, and our farming implements, cars, carriages, carts, edge-tools, cutlery goods and even glass are being shipped abroad. And the rate of money has also gone down, as you know, and that is a subject that enters into business of all kinds.

Now such is the American system of protection. Under its stimulating impulse our progress since 1861 has been without an example either in modern or ancient history, until our nation to-day, in wealth, power and civilization, stands the first among the nations of the world. (Applause.) I hold that Governments are formed not only to protect persons and property, but to render the people prosperous and happy, and that Government which by its laws comes nearest to attaining these ends comes nearest to accomplishing its purposes and objects of its foundation. I claim that my Government has accomplished that thing.

The Side Wear of Rail Heads.

Ample experience has shown, during the past few years, says the *Industrial World*, that the use of rails with flat-sided heads has proved to be the real relief which was ex-



New Lever Press.

turers. As compared with other presses of the same power and capacity, it will be seen that it occupies considerably less space. The frame is very stiff and strong.

What Protection has Accomplished.

Mr. Thos. H. Dudley, in his address in this city before the New York Association for the Protection of American Industry, said: I hold that the Government is but a large family, and that many of the rules that govern the family are applicable to the Government. The more people you have employed in wage-earning in your families, the more prosperous you are. We had 50,000,000 people when the last census was taken, and less than 18,000,000 were engaged in active employment—people over 10 years of age—and of these, 7,600,000 were engaged in agriculture; but these raised enough to feed the whole 50,000,000 in this country, and there was a sufficient surplus to supply all the wants of Europe. Four millions are engaged now in manufactures. What would be the condition if England should succeed in breaking down our protective system. What would the 4,000,000 people do? Do not understand me to say that if you repeal the tariff it would destroy every manufactory in the country. There are very strong ones that would exist, but there are hundreds that would go down. Even as a result of the repeal of duties last winter there are among iron men more than 20,000 people thrown out of labor. The protective tariff was passed in 1861. Our commerce that year was a little over \$505,000,000. Last year it was \$1,547,000,000. In 1860 our manufacturing products amounted to \$1,185,000,000. In 1880 they had risen to \$5,369,000,000. Last year we imported of manufactured products a little over \$479,000,000. Therefore, of manufactured products used in this country to-day we are making over 92 per cent., and we are importing of manufactured products from abroad less than 8 per cent.

Not many decades ago the thing was reversed. Of the manufactured goods used in this country there were not more than 10 per cent. made here, and more than 90 per cent. came from Europe. Now over 92 per cent. are made here, and less than 8 per cent. are brought from Europe. That is what protection has done. (Great applause.) Nor has it increased the price, for nearly every manufactured article to-day is less than it was in 1860. (Applause.) In 1860 you could not get steel rails for less than \$130 per ton. I have known of contracts made this year at \$37 per ton. Furniture is 20 per cent. less than in 1860. Stone and earthenware is 25 per cent. less. Cotton goods are 25 per cent. less; silk goods over 30 per cent. less; woolen carpets 12 per cent. less; woolen dry goods, 25 per cent. less. The products of our foundries in 1860 were \$28,500,000. In 1880 they had risen

pected from the very rapid wear by the wheel flanges, in passing curves, of the older rounded form of head. For obvious reasons no particularly exact or careful comparisons can be made of the results thus obtained with the experience of former years, for it is nearly or quite impossible that there should be any use of the two forms of head under precisely similar circumstances. The rolling motion of the wheel flange produces a kind of shearing action upon the side of the rail head, which is more effective probably than any other kind of contact would be likely to be in wearing away the metal, so that the duty exacted on curves from this side surface of the head is as trying—if, indeed, it be not more so—as that demanded of the top of the rail. It is true that this upper surface has to bear the weight of the passing trains, while an important wear of the side of the head can occur only on the exposed side of a curve. At the same time it is true that every cause which removes the metal from the rail head shortens the life of the whole, and hence every modification of the design or outline of the rail, and the results flowing from it, are of interest, especially as all, or nearly all, these results have been accomplished simply by making a more correct distribution of the metal, and not by mere random increase in weight, and hence in cost.

The action of the flange on the rail head of the older form was cumulative in two ways, one producing a favorable effect, viz., the gradual widening out of the side of the head, so that day by day it presented a wider flat surface to resist the flange wear. Hence, the amount of this flange wear continually decreased, although it continued persistently to reduce the width of the upper surface, and, indeed, it was by no means an unheard-of thing that this width was cut down to two-thirds or even one-half of the original size. This loss of width led to a second continually increasing result, viz., the more rapid wear of the top of the head under the passing wheels, and hence any remedy which would save the flange wear would promote the durability at the same time at the top. It is really worthy of note that the remedy for all this serious wear, although radical, was obtained by making a more rational and correct use of the material which, in amount and in cost, had long been used in the rail, but which had been put in the vertical web, and the base or flange of the rail, where, at an earlier day, it was supposed the material was needed.

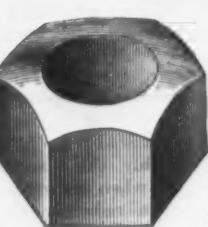
James Walton, whose death in England at the age of 81, lately took place, was a noted inventor of cloth-weaving and spinning machinery, and his two sons were the inventors of linoleum floor-cloth and new material for the decoration of walls and ceilings.

PHOSPHOR-BRONZE

FOR

BEARINGS, SLIDE VALVES, CYLINDER RINGS, CROSS-HEAD GIBBS, STEPS, BUSHINGS,

And all purposes where Maximum Durability, Anti-Frictional and Non-Cutting Qualities are Desirable.



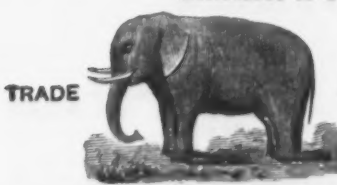
PUMP RODS,

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SCREWS, &c., &c.

Combine Toughness, Strength, Durability and Resistance to Corrosion.



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The Iron Age

AND
Metallurgical Review.

New York, Thursday, December 6, 1883.

DAVID WILLIAMS, Publisher and Proprietor.
JAMES C. BAYLES, Editor.
JOHN S. KING, Business Manager.

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In Great Britain and Ireland: 3.25 or 1.38 in other countries: 4.75 or 2.38.

What of the Future?

That there is a depression in the various branches of the iron trade admits of no doubt. Production, or the capacity for production, which at the beginning of the boom was below the demand in this country, has been increased to such a degree that it is now in excess of the present demand, which has in turn somewhat fallen off from the enormous volume it reached in 1880. We do not intend to say that the actual amount of iron of various kinds on hand made up to-day is in excess of the demands of the country. Indeed, the stock is exceedingly small; but with the changes which have come about in trade and methods of conducting business, especially such as have grown out of the increased rapidity of communication and movement of freights, it is not the actual stock on hand at a given time that affects the market so much as it is the capacity that is available to meet any demand that may arise. This is the condition to-day in all branches of the iron trade. The capacity to supply the demand is in excess of the demand of to-day, or any probable requirement of the immediate future, though we believe that in the not very distant future the demand of the country will grow up fully to the present capacity for supplying iron. The course before our iron and steel works is to wait patiently for that time.

But while this is true of the iron trade, it does not correctly represent the condition of many of the other industries of the country. Indeed, the general condition of business is not depressed. While there is an era of low prices, which is not to be regretted, there is nothing like the depression in the general business of the country, and in many of its chief industries, that there is in the iron trade. The crops of 1883 have been enormous. We have had all we could consume or sell, and have had a good demand for all that we had to dispose of to foreign countries. Money has, within a few weeks, gone begging in the streets at 2 per cent. on call. We have had good crops, large earnings and a heavy trade. Credits have been by no means largely extended, nor has the record of bankruptcy been a very large one in proportion to the volume of business done. The report of our foreign trade, just issued by the Bureau of Statistics, is quite satisfactory. Our total imports of merchandise during

the fiscal year ending June 30, 1883, was \$723,180,914, against \$724,639,574 during the preceding fiscal year, showing a falling off of \$1,458,660. The excess of our exports of gold and silver over the imports has fallen from \$6,945,089 during the fiscal year 1882 to \$3,330,942 during the fiscal year 1883. On the other hand, our exports of merchandise have largely increased, being \$804,223,632 in 1883, as against \$733,239,732 during the preceding year, an increase of \$70,983,900, and this greatly increased exportation of domestic merchandise was due chiefly to the fact that the crops of the season of 1882 were generally much larger than those of the season of 1881, and, consequently, the quantity available for exportation was larger. Another interesting item in connection with our exports for the fiscal year 1883 was the increase in the value of the exportation of the products of domestic manufacture from the United States, amounting to \$111,890,001, as against \$103,132,481 during the preceding year, and were larger than during any previous year in the history of the country. These facts certainly indicate a healthy condition of affairs in this country.

And yet, in the face of all this, there seems some distrust as to the future. There seems to be an indefinable dread of something going to happen, though what that something is there are no signs in the heavens to indicate. One element producing this distrust is, without doubt, the fact that we are on the eve of a Presidential election, which always unsettles the business of the country, and during which, as we have already indicated, legislation, which so largely affects the business interests of the country, is undertaken, not in view of the needs of that business interest, but of the needs, or supposed needs, of political parties. Another element of distrust, as we write, is the uncertainty as to what Congress will do with the tariff. Whatever may be one's views as to the advisability or necessity of tariff revision, no one can doubt but that an agitation of tariff changes inevitably unsettles business. One great element in the calculations of business men as to their future is the extent and strength of competition that they must meet. While the tariff remains fixed foreign competition is not so uncertain an element but that it can be reasonably estimated, but with changes, the amount of which may be uncertain, before them, it is well nigh impossible for even the shrewdest to decide their future course.

However, some of the elements of uncertainty that hang over the future will have so far developed themselves by the first of the year that it will be possible to arrive at a more intelligent decision as to what the outlook for 1884 will be. At the worst, we do not anticipate anything in the nature of a panic, as the country is too prosperous, on the whole, for that. On the other hand, it is possible that we may have a year of good business, though at low prices, and this is really the most probable outlook for 1884.

"Evacuation Day" Reflections.

Our readers are aware that on Monday of last week New York City celebrated the one hundredth anniversary of the evacuation of the city by the British troops at the close of the Revolutionary War. The programme for the celebration was very ambitious, but in spite of unfavorable weather it was faithfully and enthusiastically carried out. A bronze monument of Washington was unveiled on the steps of the Sub-Treasury Building in Wall street, on the very site on which that immortal patriot stood when he took the oath of office as the first President of the United States, and an oration by George William Curtis graced the occasion. An imposing civil and military procession moved through the streets of the city, typical of the entrance of the Continental army a hundred years before, and on the waters of the harbor a steamboat parade of extraordinary proportions exemplified the naval movements of the day when the British flag as an emblem of authority floated over this city for the last time. A significant cartoon, based upon the Evacuation Day ceremonies, appeared in one of our illustrated papers on the day following. The British ships are represented sailing away in 1783, with a Continental clenched fist shaken at them, but in 1883 is depicted "the daily" "evacuation of the flag that never lost its grip," the departure of Transatlantic British steamers, with fair hands waving fond farewell after them. The carrying-trade flag is still the Cross of St. Andrew's, the emblem of British supremacy on the seas.

We have achieved political independence, and for over a hundred years this country has controlled its own destiny. We have secured almost complete industrial independence, and the signs of the times are in favor of total emancipation before many years. Commercially, however, we are most helplessly dependent on foreign countries. Every year we send abroad over \$800,000,000 worth of our products, and we import almost as much from other countries, yet "the flag we fought for" is seldom seen at the mast-head of a Transatlantic steamship. A line of four vessels has for ten years been the sole representative of the United States in the merchant service between this country and Great Britain. Even this diminutive domestic venture is on the point of being suspended, as its Philadelphia owners are disgusted with its unprofitableness and are considering the best plan by which to dispose of their vessels. A few steamships in

the West Indian, Central and South American trade, and the fleet of the Pacific Mail Steamship Company, cover all the other steam marine enterprises of the United States with foreign countries. The harbor of New York, as well as of every other American seaport, is alive with ships carrying foreign flags, the American flag being conspicuously absent from almost everything but coasters.

This is an oft-told tale, but it needs to be repeated more and more frequently, until the people of the United States, through their chosen representatives, make a serious effort to change this humiliating condition of affairs. There is a cry on one side for "free ships" and the repeal of the navigation laws. But that seems to be only a leap in the dark. The admission of foreign-built vessels to American registry, and the opening of the coasting trade to foreign competition, would accelerate the decadence of American shipping interests by abandoning to foreigners the only considerable trade now controlled by home-built and American-owned vessels. Foreign ships would be only too glad of the chance to turn an honest half-penny by coming over here to carry freight from Boston to New York or New York to Philadelphia, or from Northern ports to Southern or Pacific ports, whenever the carrying trade was dull in other parts of the world. If "free ships" would prove attractive investments for American capital, there would be no guarantee that they would be able to compete for freight after our people had purchased them. The experience of France is a timely warning. Her people have bought ships in other countries to such an extent that the shipbuilding industry of Great Britain and Germany has of late been wondrously stimulated, and now those ships lack employment, and are to be found idly at anchor in every French port. It is one thing to own a ship, but it is something vastly different to secure its employment.

As our foreign commerce is so enormous, and as we ought to have a share of the business of carrying the tremendous tonnage of freight involved, the question is one of paramount interest. It should be considered from its foundation up. In the first place, we should build all our own vessels. The spirit of national economy forbids the payment to foreign countries of the vast sums which a steam merchant marine would cost. In the second place, the vessels should be built of American materials, as everything needed can be obtained in this country. The depressed condition of our industries should entitle them to receive the benefit of such a great demand as would flow from the building of a large number of steamships. In order to induce capital to invest in shipping, the business of freighting must be made remunerative. This can be done in several ways. American ships can be relieved from all taxation, all light-house fees, harbor charges and even pilot fees, while foreign vessels can be compelled to pay all the dues referred to, which can be made sufficiently heavy to become an important influence in favor of American vessels. It is alleged that such a regulation even now obtains in Great Britain to some extent and handicaps foreign vessels attempting to trade there. Again, differential duties can be so adjusted by Congress as to secure to goods brought in American bottoms a more favorable rate than those brought here in foreign bottoms. This plan has recently been proposed by Governor Butler, and meets with much favor in many quarters. Some such expedient would undoubtedly meet with more hearty popular support than would the payment of subsidies or bounties, to which the West and South would probably oppose objection under the mistaken notion that only the seaboard States would be benefited. But whatever the means, the end in view is great enough to justify the largest liberality, and we shall find our Evacuation Day reflections most profitable if they lead us to a just appreciation of the importance of developing our shipping interests.

The Speakership.

The election of Mr. Carlisle to the Speakership of the House of Representatives has given rise to a feeling of uneasiness in business circles, which, under the circumstances, is not to be wondered at. Mr. Carlisle is evidently felt under the necessity of saying something reassuring, and his address, on assuming the duties of his office, has been widely quoted as indicating that the House, under his leadership, will adopt a conservative policy. He said:

Sudden and radical changes in the laws and regulations affecting the commercial and industrial interests of the people ought never to be made unless imperatively demanded by some public emergency; and, in my opinion, under existing circumstances, such changes would not be favorably received by any considerable number of those who have given serious attention to the subject. Many reforms are undoubtedly necessary, and it will be your duty, after a careful examination of the whole subject in all its bearings, to decide how far they should extend, and when and in what manner they should be made. If there be any who fear that your action on this or any other subject will actually be injurious to any interest, or even afford reasonable cause for alarm, I am quite sure that they will be agreeably disappointed.

This is all very well, but it is susceptible of several interpretations, any one of which would be satisfactory to those whose economic creed might be summarized in the shibboleth, "American industry must go." Viewed in the light of what Mr. Carlisle said only two days before, it is not so reassuring as some people affect to consider it.

When congratulated on the caucus nomination which was equivalent to election, Mr. Carlisle said: "No, don't congratulate me. This 'fight' was made upon a principle. Be glad 'because the principle has prevailed; I only 'represent it.' Now the only principle which Mr. Carlisle represented in a conspicuous degree was the free-trade principle, and while it is gratifying to know that the pressure of official responsibility has caused him to utter words in his address to the House which seem to promise an abandonment of the 'principle' which triumphed in his election, we cannot feel at all sure that he will not later proclaim his allegiance to it. It was a fair issue between the enemies and the friends of domestic industry, and the enemies won it. If Mr. Carlisle does not attempt to carry out the purpose for which he was chosen, it will not be because he does not want to, but because as a shrewd politician he is afraid to attempt the undoing of what the protective tariff of the past 20 years has accomplished, on the eve of a Presidential election in which the 'principle' he represents has very little chance of receiving the popular endorsement. If kept in the background during the session of Congress just begun, it will be because those who are ready to thrust a knife into our national industries deem it expedient to wait until they can do so with less certainty of swift retribution. We counsel the friends of American industry not to be misled by Mr. Carlisle's reassuring words. His election represents the brief triumph of a dangerous principle, and those who rest in fancied security may be rudely awakened by a shock to our industrial system which will threaten, if it does not accomplish, its destruction.

The Agitation for Higher Tin-Plate Duties.

The movement in favor of higher duties on tin plates is increasing in strength. Not long ago the question was very imperfectly understood, and the agitation was confined to a few persons who could be counted on the fingers of one hand. They were all interested in small sheet-iron establishments in Western Pennsylvania, which had erected tinning apparatus in the hope that they might be able to compete with foreign works in the manufacture of tin andterne plates. The attempt of such a small number of persons to induce Congress to impose a high duty on an article of almost universal consumption, for the benefit of an unborn industry, seemed to be a direct effort to procure special benefits in the way of trade, and, therefore, not only in Congress, but out of it, and among manufacturers, as well as the general public, the promoters of the scheme were met with open hostility or chilling indifference. Manufacturers' associations said in effect to the would-be American tin-plate makers: "We recognize your 'right to protection to be as well-founded' as our own, but you have no great 'amount of money invested in your undertaking, and not many people are interested in what you propose to do, and, as 'we deprecate tariff agitation, we think 'you had better not stir up the question just 'now.' And if the great manufacturers' associations had had their way, the tin-plate agitators would have been forever quieted, because the time would never have come, in the opinion of such organizations, when it would have been safe to reopen the discussion of iron and steel duties. But the handful of enthusiasts kept right on, hard at work, hammering in every direction, and doing missionary work among their brother manufacturers, as well as among tin-plate consumers, and the consequence is that to-day their cause is well supported, and they are more hopeful of ultimate success than they ever were.

Their efforts were defeated last winter, it is true, and the duty on tin plates was reduced instead of being advanced, but the reduction of a mere revenue duty was not regarded as involving any principle, and, therefore, was looked upon as wholly insignificant. The old duty was too low to permit the investment of capital in American tin-plate works, and, therefore, was not worth fighting for. But the discussion before the Tariff Commission, the Congressional committees and the House and Senate brought this question into prominence throughout the country, and opened the eyes of many people to its vast importance. Manufacturers of galvanized iron at that time realized thoroughly the dangerous position they were in, when consumers of their products urged a reduction of the duties on similar foreign products, so as to bring the cost of galvanized iron more on an equality with that of tin plates. Makers of black sheet iron naturally sympathized with the galvanized-iron makers, as their product was thus placed in jeopardy. Manufacturers of raw materials could not then shut their eyes to the situation, and iron-ore and coal miners were roused. Since the passage of the tariff act, last March, the feeling toward the tin-plate duty has not weakened, but the growing depression in trade has, on the contrary, greatly widened and strengthened it. The makers of steel need other avenues of consumption, and they would gladly sell steel billets or plates to be converted into tin plates, if such a branch of business could be established here. The smelters of lead both in the South and West would be glad to have an opportunity to furnish a great part of their surplus product to be put intoterne plates. Even

consumers of tin plates are manifesting the good effects of the educational influences accompanying the high-duty agitation, and there will in the future be no fear of a solid phalanx of consumers opposing, through their Members of Congress, an effort to make the tin-plate duty high enough to encourage the domestic manufacture. We know of no industrial question that has been so persistently fought for, in season and out of season, against such fearful odds and under such discouraging circumstances, as the duty on tin plates. Success may not this winter crown the efforts of the friends of an American tin plate industry, and circumstances may defer the realization of their hopes for several years, but if their movement continues to gather strength with the momentum of the past twelvemonth, its force will ultimately prove itself irresistible.

Our Foreign Metal Trade.

In another part of this issue we present, in considerable detail, the statistics of imports and exports of iron, steel, other metals and coal into and from the United States during the month and nine months ended September 30, 1883, as compared with the corresponding periods of 1882. These figures are taken from a recently-issued statement by Hon. Joseph Nimmo, Chief of the Bureau of Statistics. Although they are not as fresh as we would like to have them, they are valuable, because they show the entire volume of our foreign coal and metal trade in the first nine months of the current year, and thus convey a correct impression of the present tendency of these branches of business. They possess special value in the new arrangement which has been adopted by the Bureau of Statistics, the items for September being given in greater detail than has hitherto been the case. Iron ore appears in this statement, scrap steel is separately classified, cotton ties are given by themselves, steel is divided into several classes, wire rods form a separate heading, &c. In these respects the present form of the monthly statement of imports and exports is a great improvement over the old one, in which a few general terms were employed to cover the whole range of iron and steel manufactures. It will take some time before the full advantages of the change can be realized, as detailed comparisons for previous periods are evidently not accessible. This will appear more plainly upon examination of the tables. We present below a synopsis of the values of the metal imports for the periods covered in the exhibit referred to, the total tonnage of the imports not being procurable:

| Commodities. | September. | | Nine Months. | |
|-------------------------|-------------|-----------|--------------|------------|
| | 1883. | 1882. | 1883. | 1882. |
| Brass..... | \$42,347 | \$65,284 | \$373,258 | \$551,853 |
| Copper..... | 37,250 | 49,645 | 310,030 | 420,678 |
| Lead..... | 10,574 | 27,337 | 69,725 | 107,230 |
| Metal compositions..... | 245,952 | 218,863 | 1,764,822 | 1,463,144 |
| Iron ore..... | 118,727 | 225,591 | 1,080,773 | 1,275,737 |
| Iron and steel..... | 2,195,583 | 5,192,216 | 25,511,474 | 39,305,594 |
| Tin plates..... | 1,500,314 | 1,329,726 | 13,845,306 | 14,062,671 |
| Crude tin..... | 592,490 | 548,640 | 4,692,336 | 3,712,276 |
| Zinc..... | 12,387 | 87,934 | 889,240 | 963,779 |
| Mineral substances..... | 4,027 | 667 | 71,224 | 85,815 |
| Total..... | \$4,856,082 | 7,755,334 | 45,905,147 | 61,908,439 |

It will be seen that the total value of the metal imports has fallen off 25 per cent. in the nine months under review. The details for the month as well as for the nine months are worthy of critical examination. In the table below we have combined the values of both domestic and foreign exports so as to present the complete volume of the metal export trade in one exhibit:

| Commodities. | September. | | Nine months. | |
|-------------------------|-------------|-----------|--------------|------------|
| | 1883. | 1882. | 1883. | 1882. |
| Brass..... | \$22,642 | \$14,208 | \$183,861 | \$172,288 |
| Copper..... | 497,192 | 85,846 | 3,620,494 | 796,670 |
| Iron & steel..... | 1,959,138 | 2,161,667 | 17,566,802 | 17,532,895 |
| Lead..... | 7,057 | 3,449 | 50,151 | 54,336 |
| Metal compositions..... | 2,502 | 2,569 | 35,066 | 19,637 |
| Crude tin..... | | | 19,098 | 50,179 |
| Tin manufactures..... | 14,077 | 13,057 | 160,617 | 162,777 |
| Zinc..... | 2,261 | 30,790 | 12,511 | 108,209 |
| Total..... | \$2,505,859 | 3,171,716 | 21,569,080 | 18,887,981 |

This statement shows that our exports of metals have increased considerably. The movement of copper has especially swollen, and the increased value of the exports is almost wholly due to it.

A general reduction in wages in each branch of the iron trade in which, under the existing agreements, they can be reduced, seems to be in progress all over the country. The steel-workers' agreement expires on the 1st of January, when there will no doubt be a reduction, the extent of which is now in course of discussion between the manufacturers and operatives. In the Western iron trade the classes of labor that are governed by the scale of wages agreed upon between the Amalgamated Association and the Manufacturers' Association will not be disturbed until the 1st of June, though the consideration of the new scale, and the discussions as to the reduction, if any, that will be conceded, will begin in February or March. The wages of other classes of labor, however, are already being reduced, the reduction being generally 10 per cent. In the East, under the existing scale, wages can be reduced on the sliding basis until the quoted price of iron is 2 cents a pound, and this limit, we believe, is very nearly reached, if not quite. Outside of the classes governed by this scale reductions are taking place as they are in the West, the amount of reduction being generally 10 per cent. There is one thing to be said about these reductions, how-

ever, and that is that while they are not pleasant to contemplate, the reduction in wages comes long after the reduction in profits.

"Laissez Faire."

Laissez faire, with many of the other "idols" of the Manchester school of political economists, is fast losing the reverence of its old votaries. An English economist recently declared that "it has become a by-word. Liberals speak of it with scorn; to avow any belief in it is to be an old fogey or a Whig of an antediluvian species." England has experienced altogether too much benefit from legislation that has been an entire ignoring of the *laissez-faire* principle to any longer adhere to it, and she could not, if she would, return to the old doctrine of non-intervention by law in industrial matters. All of the great body of law that is on the English statute books looking to the improvement in the condition and safety of the laboring population of that country is directly opposed to the *laissez-faire* principle, and has been from the first objected to by those who were its disciples. Professor Fawcett, for example, has from the first opposed the legislation that made it illegal to employ women in the mines and limited the age at which children could be so employed. Indeed, about the only important industrial legislation, or refusal to legislate, that recognizes the *laissez-faire* principle to-day in England is legislation on protection, and in this *laissez-faire* is still the shibboleth. But the same arguments that have resulted in the abandonment of this principle in legislation where life, health and morals of the labor population were concerned, must inevitably and logically result in its abandonment in connection with protection. Conceded that the State may interfere with the industrial freedom of its citizens, then the extent to which that interference may be carried must be decided from time to time in accordance with what the legislators of that time conceive to be for the best interests of the State, and this is all that the protectionists have ever claimed.

The Condition of Trade.

Although the past week was a broken one, owing to the general observance of Thanksgiving Day, there was a fair amount of business transacted in most branches of the iron and steel trades. The movement of pig iron was better than had been anticipated, as canal navigation has closed for the season. The demand is mainly of a retail character, but as buyers are urgent for very prompt deliveries, sellers feel confident that it will continue, although no large volume of trade is expected for the next two months. If prices can be sustained until spring trade opens, and of that there is little doubt unless stocks again accumulate rapidly, manufacturers look for greatly improved trade. Much will depend upon Congressional legislation, however, it being unfortunately possible for Congress to completely demoralize business.

Steel rails have displayed some animation in the past week, very large sales having been made in the West, and some of the Pennsylvania companies having secured considerable business for next year. No more sales have been made at the figures which recently prevailed at Chicago, the Pennsylvania companies holding stiffly to \$35 at mill, and the Chicago companies refusing to sell below \$37. The belief is growing that steel rails have touched bottom, and that the railroads which have purchased at or below \$35 have secured bargains. Some Pennsylvania companies are even now asking \$35.50 for next fall deliveries. The leading companies will shortly have their capacity engaged for next spring and summer, and will be in a position to demand higher prices. The coming winter is not provided for, and some of the mills may be obliged to close temporarily, but they can then make ample repairs and get in good shape for the next year's run.

The finished-iron trade continues dull, and is probably in worse condition than it has yet been. There is very little demand for bar iron, or for plates, sheets and shapes. The mill owners are not forcing sales, but many of them are closing their works, to await a revival in the demand. Many other mills will be closed from December 15 until after the holidays, which will be a longer stop than usual, for repairs, and it is estimated that this month not half the capacity of the rolling mills of the country will be active. As the mills are carrying little stocks, and as merchants have but moderate supplies, it is believed that January will see some improvement in the demand.

The merchant-steel trade still lacks tone, and prices are but nominally maintained. A peculiar contest is being carried on by domestic manufacturers against imported steel. The finest grades are now produced in this country, and the foreign article is meeting with severe competition, while the ad valorem rates of the new tariff permit low grades of steel to be imported on favorable terms to compete with the domestic product of a corresponding character.

Undaunted by his previous failures in this line, Secretary Folger has again undertaken to reform the tariff. In his forthcoming report, after discussing the amount of surplus revenue, and objecting to the abolition of the internal-revenue tax, he recommends a further reduction of customs duties after

a proper inquiry shall have developed what articles can best stand the reduction. The Secretary is embarrassed by the new law which has so recently been passed that it would seem proper to give it a trial before endeavoring to change it; but it has not accomplished the purposes which he desired to effect when he last year recommended that a reduction of revenue be made by a revision of the tariff that should reduce the duties on sugar, iron, steel, woollens and wool, cottons and raw material. Therefore, these recommendations must be substantially renewed, for the dangers of a large surplus are even more threatening than they were before the passage of the tariff act. We wonder if it has ever occurred to the Secretary that a reduction in customs duties does not necessarily reduce the revenue, especially if the principle of protection is retained in the law. Indeed, the only way in which a reduction of duties would reduce the revenue is to bring the tariff law to a revenue basis—or, in other words, to ignore protection, and to put duties at such a low rate that even with the immense volume of our imports, and the increased volume that would come from low duties, the revenue would of necessity be reduced. The Secretary seems to have understood this principle in connection with the reduction of the taxes on tobacco and spirits, as he states in his report that a decrease in the tax on these does not necessarily bring a smaller revenue, experience often having shown the contrary, and the Secretary might, by a little thought, have carried this principle over to customs duties as well, and have argued that a reduction of duties here does not necessarily bring a reduction of revenue.

The Suez Commercial Highway.

The whole trend of events in the Orient, year after year, points unerringly to the future paramount influence of the Suez Canal in Eastern affairs. It was the rebellion of Arabi Bey that made necessary, as we have been told, the interposition of the British Government to preserve the canal from blockade, if not from destruction. The French invasion of Tonquin gives the canal new importance, and now the sanguinary triumph of the so-called Mohammedan Messiah carries with it an assurance that, so far from evacuating Egypt, the British forces are constrained to enter upon its permanent occupation, necessarily enhancing the prospective value of the Suez Canal as a channel of communication with the far East.

The coincidence of these later events may have hastened to an agreement the pending negotiations between British shipowners and M. de Lesseps with reference to canal management. The result is a convention providing either for the enlargement of the present canal or the construction of another. English shipowners have long been restive under the alleged exactions and "vexatious pedantry" attending French control. The tonnage dues were exorbitant, and French ships were said to receive undue favor, while English vessels which ran aground were subjected to heavy costs, as a consequence of the company's own failure to fulfill their engagements. The London Times, on the occasion of M. de Lesseps' recent official visit to the British metropolis, said: "This country demands merely the practical recognition of co-ordinate rights which no cession or charter can obliterate; and no agreement which does not make provision for the exercise of such rights will be accepted. Small concessions in the way of reducing dues or improving the waterway do not meet the necessities of the case. The question of principle has now been raised and cannot be satisfactorily settled except by some arrangement giving to this country a share of control, whether in the existing canal or in a duplicate channel, in some degree commensurate with its political and commercial interests."

England reasonably objected that a nation that does not hold half the stock nor own over 5 per cent. of the shipping passing through the canal should arrogate to itself the right of exclusive control. Under the convention now concluded, not only will England be more liberally represented in the directory, but large pecuniary concessions have been secured. From January 1, 1884, pilotage dues are to be abolished, and from January 1, 1885, transit dues are to be diminished according to the rate of dividend. Moreover, French and English engineers will at once consider the question of enlargement or a second canal.

Electric Locomotion.

From a brief account which we publish elsewhere in this issue, it will be seen that the problem of electric locomotion is rapidly approaching solution. The trial of the Daft motor, to which we refer, was important in more than one way, chief interest being centered in the circumstance that it was the first practical test ever made in any country of an electric motor upon a steam railroad. A prominent feature of many electric railways thus far brought out, and in some instances in practical operation, was the necessary insulation of the rails, with the attending disadvantages of difficulty in working in rainy weather, or when by some other means the electric current found opportunity to pass into the ground. The nature of the systems obviously called for special construction and thus prevented their ready adaptation to existing lines of railway, factors which are of no little importance in the question of gaining general favor. Mr. Daft, by a fortunate

combination, avoided these objectionable features, and the system, from present indications, bids fair to experience encouragement and practical success.

The difficulties likely to be met with at any time in the working of other systems were well illustrated at the recent opening of the line running from Portrush to Bushmills, England. The current in this case is conveyed through a conducting rail supported on insulators some distance above the ground, and contact with the motor is maintained by an arm attached to the latter and provided at one end with a brush. On the day appointed for the opening of the road, it was found that, owing to some obstacle which even diligent search failed to reveal for some time, the engine would not draw the train. At length it was discovered that progress was rendered impossible by a small piece of iron connecting the conducting rail with the road-bed, the current thus being transmitted to the ground as rapidly as it was generated. Removal of the impediment restored a normal condition, and a trip over the road was then made without further difficulty. As suggested by a contemporary, this would give a bright idea to the Jesse James of that future when the electric railroad is to do away with the present iron horse. Now, however, that an important step in advance has been made, such occurrences may perhaps be classed with things of the past.

Fuel Economy.

It is a remarkable fact that, while the principles of perfect combustion are so well and thoroughly understood, their practical application tending toward an economical fuel expenditure has not yet been achieved in a general way. Combustion has been defined as the rapid union of combustible elements in a fuel with the oxygen. If we regulate the supply of oxygen to the fuel so as to be just sufficient to burn the combustible elements completely, we have arrived at the point of highest economy in fuel. To show that it is possible for an economical and an uneconomical combustion to take place in the same apparatus, we may take the case of an ordinary lamp. If we turn the wick up to too great a height, the lamp will smoke, the supply of oxygen being too small; if, now, we turn the wick down, decreasing in this manner the amount of combustible, and, therefore, increasing the relative amount of oxygen, we find the smoke disappears. Let us look at the question of perfect combustion from a chemical standpoint.

It has been definitely ascertained that each of the different combustible elements requires a definite amount of oxygen for complete combustion. These are given in the following table:

| Combustible. | Pounds of oxygen per lb. of combustible. | Pounds of air per lb. of combustible. |
|-------------------------|--|---------------------------------------|
| Hydrogen..... | 8 | 34.8 |
| Carbon (imperfect)..... | 1.333 | 5.8 |
| Carbon (perfect)..... | 2.666 | 11.6 |
| Carbonic oxide..... | 0.571 | 2.488 |
| Cyanogen..... | 1.331 | 5.334 |
| Methane..... | 4 | 17.4 |
| Ethane..... | 3.738 | 16.24 |
| Olefin gas..... | 3.428 | 14.912 |
| Acetylene..... | 3.076 | 13.361 |
| Propane..... | 3.636 | 15.317 |
| Propylene..... | 3.428 | 14.912 |
| Allylene..... | 3.2 | 13.920 |

Knowing the chemical constitution, we may readily determine the amount of air necessary. The average composition of anthracite coal from Pennsylvania collieries has been found to be about 85 per cent. carbon, and hydrogen and sulphur in such appreciable quantities that they may be neglected. In other words, we may take that for every 100 pounds of coal we would find 85 pounds of carbon; hence we require $85 \times 2.666 = 226.61$ pounds, or 2539 cubic feet of oxygen, to complete combustion of 100 pounds of this coal, or $85 \times 11.6 = 986$ pounds, 12,214 cubic feet of atmospheric air is required. The combustion of this 100 pounds of fuel, therefore, produces 2539 cubic feet of carbonic acid gas and 9675 cubic feet of nitrogen gas. This latter plays not only a neutral, but also a negative, part in the phenomena of combustion; it is necessary to raise the heat of this volume of gas from the temperature of the outside air to the temperature of the fire-box. Practically, it has been found that the theoretical supply would be found wholly insufficient to produce the desired effect. This is caused by the proximity of one mass of fuel to another and to the grate bars, to sluggish draft, improper boiler settings, &c. These and other practical difficulties have so altered our rules that, when the amount of air required is determined as above, the chimney is designed of such capacity and height as to accelerate a draft sufficient to furnish double the amount of air as thus determined. Having thus seen how far practical considerations of draft, &c., influence the quantity of the air supply, thus reducing the economic capacity of furnace, we will next investigate the question, "How, when and where shall we admit the air to get the highest economy?"

To consider this question fully, it is necessary for us to look into the question of combustion a little more deeply. Suppose we mix in a measured jar containing an inflammable gas a due quantity of oxygen; performing the operation slowly, we find a due incorporation ensues, and the combustible gas becomes thoroughly burned without producing smoke. In this experiment the quantities are small; both are gases; there are no foreign matters present to exert a disturbing influence on the union; there is no draft or current to exert its influence, and, further, both are supplied in the correct proportions to produce perfect combustion. In a fire-box the quantities used are large; exist in two different states, viz., solid and gaseous; the gases produced are of different nature, viz., some combustible and others incombustible; the oxygen is hurried off by the chimney draft frequently before its work is half completed. In consideration, then, of these differences, it is evident that to produce complete combustion of any fuel, as coal, consisting of solid and gaseous ingredients,

we must introduce the air in such a manner that the mixture between its oxygen and the combustible elements of the fuel should be very intimate. This can only be accomplished by a subdivision of the volume of air employed into separate currents, which insures a thorough mixture. When and where these subdivided currents should be introduced can be readily seen.

Suppose we have just started a wood fire on our grates which has arrived at a certain intensity, making it ready for the introduction of coal. The latter not being at a point of incandescence, the volatile hydrocarbons are distilled by the heat from the wood, pass off, and are conducted toward the uptake. These gases are, however, combustible, and if sufficient oxygen remains in the air, which has been, in ordinary types of fire-boxes, drawn over the blazing wood and igniting coal, they will burn, giving a high temperature. If, as is usual, there is not sufficient oxygen left, these gases are but partially burnt and rejected, still possessing considerable potential heat. It is, therefore, necessary to supply these gases with air from the atmosphere by some other route than that of the ash-pit, grate and fire-box; this could readily be effected by means of an air supply to the combustion chamber. The time of introduction of the air in this way should be only after and during the process of distillation of the coal gases, as admission of air at this point at any other time would result in chilling the gases produced by the combustion of the solid fuel in the fire-box.—*Mechanics.*

The Scranton Steel Company.

The stockholders of the Scranton Steel Company, of Scranton, Pa., have decided to increase the capital of the company from \$600,000 to \$1,500,000, to provide funds for the erection of blast furnaces. It will be some time before the company's plans are fully perfected, but there is no doubt that two large blast furnaces will be pushed to completion as speedily as possible. If the same policy prevails in the erection of these furnaces that was carried out in the building of the company's steel works, they will be models of their kind both for production and economical appliances. The steel works were built with the expectation of turning out 80,000 tons of rails per annum, but they have developed a capacity of 2,500 tons per week, although they have only two 4-ton converters. The reversing rail mill is one of the largest in the world, being precisely similar to the widely celebrated reversing mill of Bolckow, Vaughan & Co., at Middlesbrough, England. The Giers soaking pit has been used for some time, which obviates the use of reheating furnaces, and 120-foot rails are rolled direct from the soaking-pit, being afterward cut into four rails of the ordinary 30-foot length. The works have received flattering encomiums from the engineers of other works who have visited them, and not long ago one of the most wide-awake visitors remarked that the only improvement he could recommend was the addition of the direct transmission of molten metal from the blast furnace to the converter. When the proposed blast furnaces are completed this will be done.

Since the purchase of the Pittsburgh Bessemer Steel Works by Carnegie Bros. & Co., the Scranton Steel Company's works have been the only steel-rail establishment in the United States entirely dependent for its supply of pig iron on the open market. The addition of blast furnaces will show that this company propose to continue to manufacture steel rails, notwithstanding the present unsatisfactory outlook.

WASHINGTON NOTES.

(From Our Own Correspondent.)

WASHINGTON, D. C., Dec. 4, 1883.

The unexpected result of the contest over the Speakership has been a topic of universal discussion in political circles. The confidence of the protection Democrats in the triumph of the better judgment of their party doubtless had much to do with misleading the friends of Mr. Randall, but there were also other reasons for the sudden collapse of the latter gentleman's campaign during the last two days of the struggle. For instance, the leaders of the free-trade wing of the party in the House cited his course on the tariff, referring to his interviews last spring, favoring incidental protection, and his later speech in Ohio, in support of a sweeping abolition of the internal revenue tax. In this the free-trade members of the West and South saw a movement to cut off all possibility of any modification of the tariff. Then the hue and cry against the election of a Southern man, on the ground of expediency, naturally unified Southern sentiment against him, and, finally, the bringing of the business interest to the front as another ground of opposition irritated the Southern members, who at once set up the counter claim that Southern interests were as important as those of the North, and, as the Southern vote in the House exceeded that of the North, the South was entitled to the direction of party affairs. Thus the main issues of the contest in behalf of Randall reacted in favor of his opponent.

WHO WILL CONTROL PARTY POLICY?

The claims of the Southern Representatives that their numerical strength in the House entitled them to predominance in its affairs were supplemented by the position taken by Mr. Carlisle and kept constantly in view by his principal lieutenant, Mr. Morrison, on the tariff question. This was the real issue at stake, and was to decide whether the free trade or the protection wing of the party was in the ascendancy. The enormous majority of Mr. Carlisle over the protection candidate, and, in fact, over the combined vote of the two other candidates, settles that question beyond a doubt.

ANALYSIS OF THE VOTE ON SPEAKER.

The following shows the vote for Speaker in the caucus, which was the real test of strength as a political issue, by sections:

| | Carlisle. | Randall. | Cox. |
|-------------------------|-----------|----------|------|
| New England States..... | 1 | 2 | 2 |
| Middle States..... | 1 | 21 | 18 |
| Southern States..... | 71 | 20 | 4 |
| Western States..... | 30 | 7 | 8 |
| Pacific States..... | 3 | 1 | 3 |
| Total..... | 106 | 52 | 30 |

WHAT THE VOTE INDICATES.

The manufacturing States of New England were equally divided, giving the two free-trade candidates three and the protection candidate three of their Democratic votes. In the four Middle States, where the manufacturing interests are large, Delaware gave her one vote to Carlisle as the candidate of the Southern wing of the party, and without reference to the growing industries of Wilmington and other centers within her borders. Mr. Cox received 13 out of the 21 Democratic votes of New York representing the free-trade constituencies, and Mr. Randall had the support of the entire 11 votes of his own State, and seven from New York and three from New Jersey added. In the Pacific States the protection candidate received but one vote, while the two free-trade candidates evenly divided the remaining six votes.

WHERE THE STRENGTH CAME FROM.

The aggregate of the above States, exclusive of the Pacific States, representing the great mechanical industries of the country, and favoring a protective tariff, gave Carlisle two votes and Cox 15, or a total of 17, against 24 for Randall. In the Southern and Western States, where the Democratic party takes a bold stand for free trade, Carlisle rolled up the startling number of 101 votes, against but 27 for Randall, or nearly four to one, and with Cox's 12 votes, more than two to one.

The analysis of the vote given may, therefore, be regarded as foreshadowing the policy of the majority in the Forty-eighth Congress.

HISTORY REPEATING ITSELF THE WRONG WAY.

In 1811, just 72 years ago, Henry Clay, of Kentucky, entered the House of Representatives and was chosen Speaker on the first day of his appearance in that body, and was five times re-elected to that post. It was during his presence in the House in the session of 1810-20 that he came forward boldly as the champion of protection to American industry. Eleven years later, in 1831, having been elevated to the highest body of the legislative branch of the Government, he again labored strenuously in the interests of the tariff, and as a recognition of his broad views of the best interests of the country was three times nominated for President of the United States. To-day we have a citizen of Kentucky again in the Speaker's chair, a gentleman of undoubted ability but representing a public policy affecting the economic interests of the country diametrically opposed to those so boldly advocated by his illustrious fellow citizen and predecessor. It may be possible that John G. Carlisle, in his own way, will experience the same prominence as the champion of free trade, and experience the same results of defeat and disappointment. There is no doubt that the sentiments of the mass of the people to-day favor the views of Henry Clay rather than those of John G. Carlisle on the question of protection of American industry. His election to the Speakership is certain to bring the question to the test.

WHERE OUR SPEAKERS CAME FROM.

It is interesting to note the States that have furnished the Speakers of the National House of Representatives. In the long array from Muhlenberg, of Pennsylvania, to Carlisle, of Kentucky, the latter State leads. Henry Clay, of Kentucky, filled the chair of the 12th, 13th, 14th, 15th and 18th Congresses; John White, of Kentucky, occupied the chair of the 27th Congress, and Linn Boyd, of Kentucky, the 32d and 33d Congresses, making in all eight Congresses or 16 years for Kentucky, and now, John G. Carlisle adds another, the 43d Congress, to the list. Virginia stands next, having filled the chair during six Congresses, viz., the 17th by Philip Barbour; the 20th, 21st and 22d by Andrew Stevenson; the 26th by R. M. T. Hunter, and the 28th by John W. Jones. Pennsylvania occupied the chair of the 1st Congress in the person of A. Muhlenberg, who also filled the chair of the 3d; Galusha A. Grow the 37th, and S. J. Randall part of the 44th, 45th and 46th. Next is represented Massachusetts in the persons of Theodore Sedgwick, in the 6th; Joseph B. Varnum, in the 10th and 11th; Robert C. Winthrop, in the 30th, and N. P. Banks, in the 34th Congresses. Indiana filled the chair in the persons of J. W. Davis, of the 29th; Schuyler Colfax, of the 38th, 39th and 40th Congresses, and Michael C. Kerr during part of the 44th Congress. Of the other States, the Speaker's chair has been filled for three Congresses by Representatives from the States of New Jersey, North Carolina, Tennessee and Maine; twice by Representatives from South Carolina and New York, and once by Representatives from Connecticut, Georgia and Ohio.

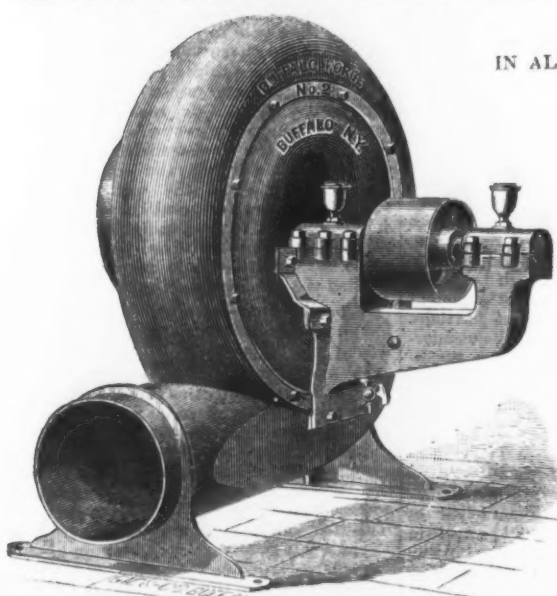
THE CHAIRMANSHIPS.

The Speakership having been disposed of, the next question in order is the chairmanships of the important committees. These include about 20, the Committee on Ways and Means ranking third on the list. The task of distributing the 325 members of the House among the 43 standing, 5 joint and 9 select committees, so as to secure efficient work, and not to offend the personal wishes of the personal friends, is no easy undertaking, as may well be imagined. The time usually required to complete the work is from two to three weeks, taking the experience of the last four or five Speakers. It is, therefore, early to speculate upon this subject. It is settled, however, that Mr. Morrison, who nominated Mr. Carlisle, and who was his champion from the start, will be chairman of the Committee on Ways and Means. John Randolph Tucker, of Virginia, another free trader, will also be a member, and the friends of the notorious Frank Hurd, of Ohio, are pressing him. Mr. Carlisle's advisers suggest Kasson as the head of the Republican wing of the committee, for the reason, as they assert, that he is not entirely sound on the high protective tariff principle. Judge Kelley will doubtless go on as a matter of courtesy.

AN AGGRESSIVE POLICY.

Speaker Carlisle says that his election is the beginning of a new departure, a recognition of principle—that the Democratic party would now go before the people with an aggressive policy on all great issues. This is a very plain statement of what the people will have to face on the tariff question.

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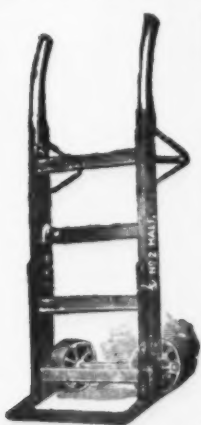
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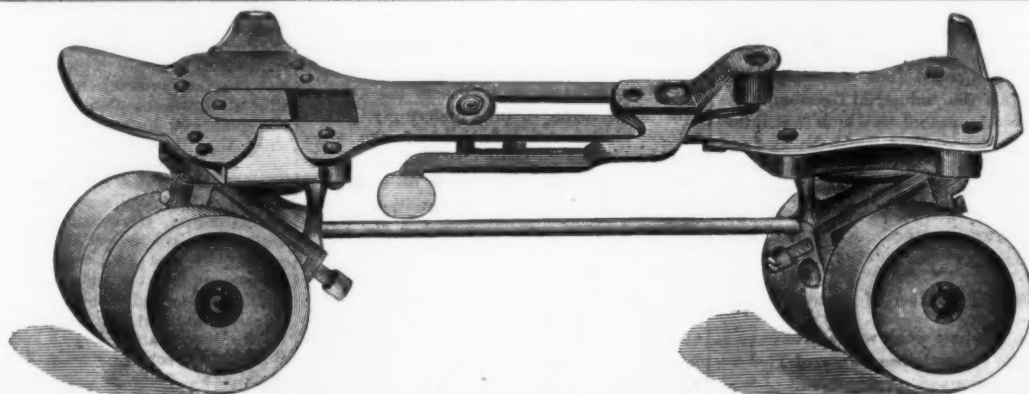
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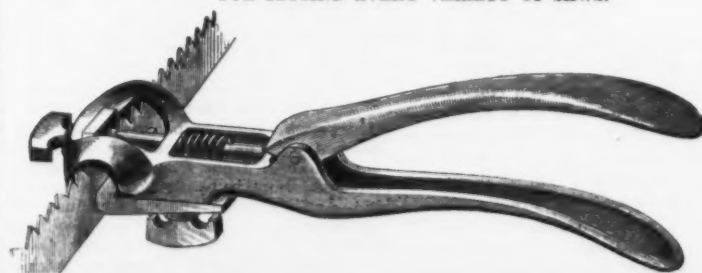


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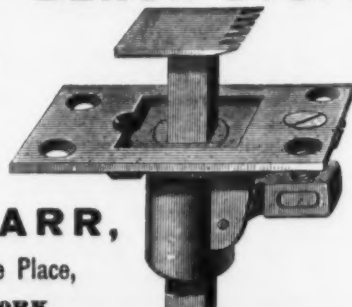
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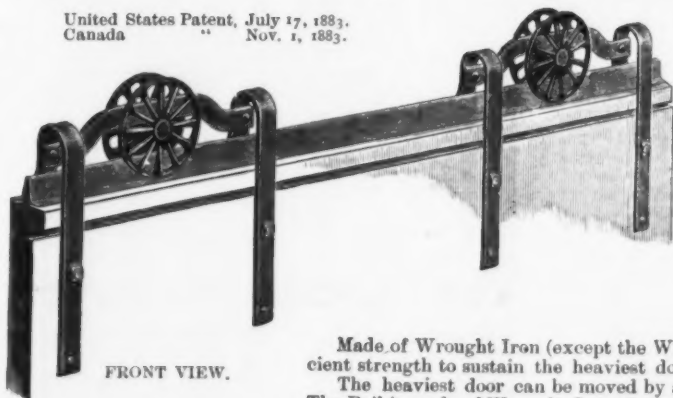
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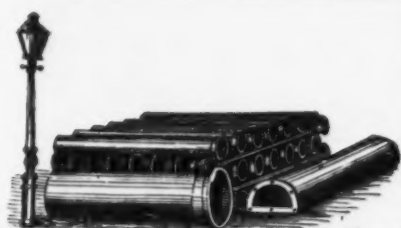


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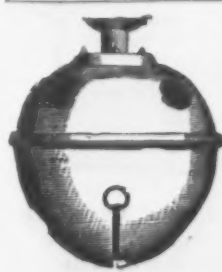
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It looks like the old Clay campaigns over again.

THE POLITICAL COMPLEXION OF THE FORTY-EIGHTH CONGRESS.

The official roll of the House of Representatives of the Forty-eighth Congress, prepared by the clerk, shows the total representation to be 325, as established under the new apportionment, as follows:

| | |
|-------------------|-----|
| Democrats..... | 194 |
| Republicans..... | 120 |
| Readjusters..... | 5 |
| Independents..... | 4 |
| Greenbackers..... | 2 |

Congress was set in motion by the usual forms incident to such an occasion. Upon taking the chair the new Speaker ventilated his views on the all-absorbing topic by insinuation rather than by direct application, which suggested the policy of disarming the public apprehension of unfavorable action. The speech is regarded as an extremely adroit composition. It admits that something will be done, but how far and when and how must be governed by party expediency just now. The observation that there need be no fears of anything "actually injurious to any interest" being done is looked upon as a polite way of saying that "tariff for revenue only" belongs in that category.

THE PERUVIAN TARIFF.

Minister Phelps has notified the Department of State that General Iglesias has issued a decree, dated October 24, re-establishing the duties at the ports evacuated by the Chileans. The tariff in force up to January 13, 1881, remains in force, with the addition of 10 per cent. ad valorem increase on articles in classes 1, 2, 3, 4 and 6, and 5 per cent. ad valorem increase on the rates of classes 5 and 9. On all articles hitherto on the free list a duty of 5 per cent. ad valorem is imposed.

Rolling Mill Items.

TRENTON, N. J., Nov. 25.—A reduction of 10 per cent., to go into effect on the 10th of next month, has been announced in the wages of the "ton" men at the New Jersey Steel and Iron Works, in this city. The "ton" men include the puddlers, rollers and heaters, who number a couple of hundred, and whose wages range from \$2 to \$4 a day.

PITTSBURGH, PA., Nov. 30.—All the miners of the Cambria Iron Company, at Johnstown, struck this evening against a 10 per cent. reduction, which takes effect to-morrow. This will not stop the mill. The Knights of Labor are resisting reductions and sustaining strikers to the full extent of their ability. Not for years has the labor situation been so unsatisfactory as at present.

A telegram to the New York Herald, dated at Pittsburgh, November 30, says that Oliver Brothers & Phillips and the Republic Iron Works have reduced their employees' wages 10 per cent., but this must only relate to special classes of workmen, as the wages of rolling-mill hands will hardly be altered until next June. The same telegram says that the Scutt Barbed Wire Mill is closed, and it is not known when work will be resumed.

IRONTON, OHIO, Nov. 23.—The Kelly Nail and Iron Company, who have been building a new mill, have a strike on their hands before they get their mill in operation. The nailmen who were to be employed in the mill put in a bill for getting the machines ready for work, which the operators refused to pay, as they thought the price exorbitant, in consequence of which the nailmen refused to start the machines.

PITTSBURGH, PA., Nov. 28.—Nearly all the iron mills are shutting down to-day on account of Thanksgiving. Several of them will not light up again until Monday, thus giving the men a three days' vacation. None of the mills are crowded with orders, and can easily afford to lie idle.

PITTSBURGH, PA., Nov. 29.—The shutting down of the Edgar Thomson and Pittsburgh Bessemer Steel Works is now a matter of certainty within a very few days if no new orders come in. The orders at present to be filled by the Edgar Thomson works will not last longer than the first week in December, unless they succeed in filling an order for 1000 tons of rails, which they have on hand, but which the party for whom they are to be made does not wish to have made at present. The Pittsburgh Bessemer Steel Works, at Homestead, are now manufacturing billets and blooms for the Union Iron Mills. They also have an order for rails, which, if satisfactory arrangements can be had, will be filled, but which will not run the works longer than the 15th of next month. Wilson, Walker & Co.'s mill shut down yesterday evening on account of lack of orders. How long the suspension will last is not known. Miller, Metcalf & Parkin and the 5-inch department of Clark & Co.'s mill also stopped yesterday evening. Lack of orders is given for the reason in both cases. Singer, Nimick & Co., of the South Side, are making a change in the running arrangement of their mills. One-half of the men are to work the first three days of the week and the second half the last three. Oliver Bros. & Phillips are starting up again to-morrow morning, to run full time with a full crew of hands. The Black Diamond Steel Works are running full double turn, with plenty of orders. The Keystone Bridge Company have plenty of orders, and report the outlook as favorable for a continuation of the same. Notwithstanding the dullness in other branches of the iron trade, the car works are busily employed, and boiler shops, locomotive works and establishments manufacturing tools and tool-making machinery have a good many orders ahead.

HALIFAX, N. S., Dec. 1.—The London-derry Iron and Steel Company are in financial difficulties. Possibly the company will be wound up and the assets go to form a new company. The Merchants' Bank, of Halifax, is involved to the extent of \$100,000, and Gillespie, Moffatt & Co., of Montreal, to the amount of \$72,000.

PITTSBURGH, Nov. 29.—The Dispatch reports the suspension of the Kittanning Rolling Mills. The men were paid off yesterday, and the mill will shut down for an indefinite period.

READING, PA., Dec. 3.—The nailers at the nailworks of the Pottstown Iron Company, at Pottstown, went on strike this morning,

refusing to submit to a reduction of wages, notice of which was recently given by the company. The strikers held a meeting to-day and resolved to stand out against a reduction. They say that the proposed reduction will reduce their wages to within 2 per cent. of the lowest figure ever reached, which was in 1878. There are about 100 nailers, 100 feeders and 20 furnacemen on both turns. The wages heretofore paid ranged from \$75 to \$90 for nailers and \$30 for feeders per month. The company has many orders.

JOLIET, ILL., Dec. 4.—Notices were posted to-day in all departments of the Joliet Rolling Mills that the mills will be shut down for an indefinite period and the hands discharged on Dec. 15. The reasons for closing the works are not given.

BALTIMORE, MD., Dec. 4.—Messrs. Coates & Brother, proprietors of the Locust Point Rolling Mills, failed to-day. Their liabilities are about \$75,000 and their assets about the same. The firm state that every cent of indebtedness will be paid. The rolling mills employed 200 men. The mills were shut down on Saturday night and all the men were paid in full and discharged.

Exodus of Barb-Wire Manufacturers.

—It is reported that a secret meeting of all the barb-wire manufacturers of Joliet, Ill., was held at that city on the 10th ult., for the purpose of forming a pool, not only to oppose Washburn, but to effect an agreement whereby all the manufacturers will desert the State in a body and locate in St. Louis, Kansas City and other Western points covered by the effect of the recent decision of Judge Treat, in St. Louis, pronouncing Washburn's patents invalid. Judge Blodgett's decision in that district, which upholds Washburn and gives to him the exclusive right for barbed wire for fence purposes, is still in effect, and all manufacturers in his jurisdiction are held subject to Washburn's patent, while in Judge Treat's district Washburn is powerless, and manufacturers are permitted to go ahead without interference and without the payment of any royalties whatever. They can, therefore, put out their product and reap a good profit at prices which, on account of heavy royalties, manufacturers in that district cannot compete with except at a loss. This new corporation already has agents out West hunting for desirable locations, and the hegira of the barb-wire men from Illinois may soon be expected. The citizens of Joliet are considerably exercised about it, since it will throw from 500 to 1000 men out of employment and take from the place its dozen or more barb-wire fence factories, which add largely to the wealth and business prosperity of the city.

Carrying a Steamship in Sections.

The Athabaska, one of the Clyde-built steamships for the Canadian Pacific Railway, recently arrived at Buffalo. She came in two sections, which will be joined into a complete hull at the lower dry-dock of the Union Shipyard. The Athabaska is one of the five steamships that will form a line from Algoma Mills, Georgian Bay, to Port Arthur, Lake Superior, a distance of 350 miles. The line will be owned and run in connection with the Canadian Pacific Railway. The Athabaska is of steel throughout. She is 270 feet over all, 38 feet beam, draws 16 feet 2 inches, and measures 8 feet between decks. The hull is divided into seven compartments. Her carrying capacity is about 2000 tons. One of the most remarkable of her appliances is what is called a repeating telegraph, by means of which the pilot gives the signals to the engineer, who receives them on a dial in the engine room, and sends them back to the pilot on the bridge. The latter can thus tell whether his orders have been understood. Another indicator on the bridge shows the direction of the rudder at all times. On the arrival of the Athabaska at Montreal it was necessary to cut the hull in two in order to take it through the shallow canals of the lower St. Lawrence. As she was built with this object in view, the work was readily accomplished. The sections were placed on pontoons to go through the canals. Arriving at the foot of Lake Ontario, the pontoons were removed, and the parts rested on their own bottoms.

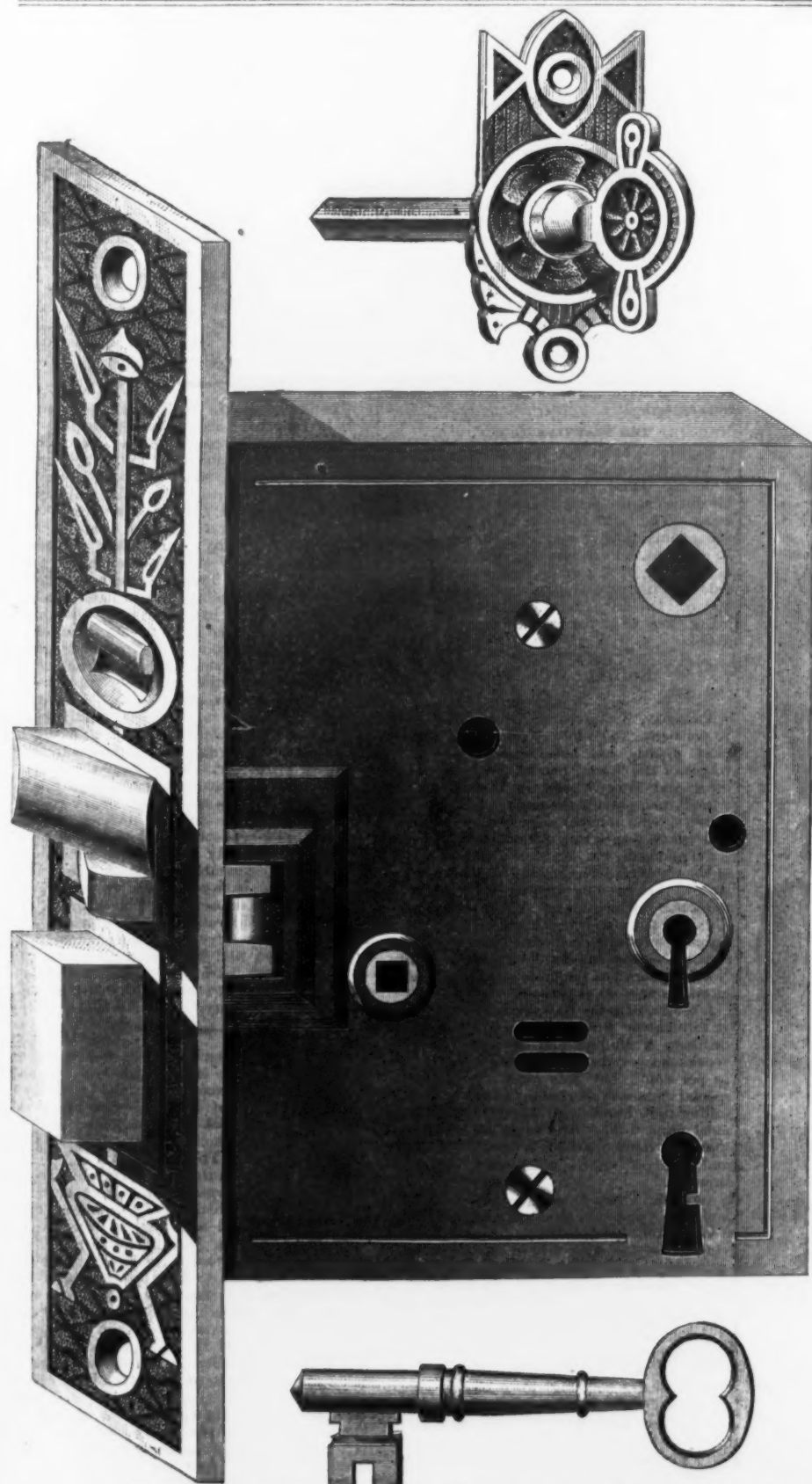
An exchange says: "The Owaseo River Railroad, running into Auburn, N. Y., is to be equipped with electric gates for crossings. The gates will be set over the tracks, so that their tendency, through the influence of a spring at the hinge side, will be to fly open, but they will be held shut by electric catches. As the train approaches the gateway from either direction, the first set of wheels coming in contact with a spring set by the rail at some distance from the gate closes a circuit and releases the gate, so that it flies open. Then the pressure of the wheels upon a double lever arrangement by the side of the track keeps the levers down until the last truck has passed through the gateway, when the lever will rise again and the gate is automatically closed behind the train. In addition to opening the gates at each crossing, as the train approaches the apparatus causes gongs to sound continuously until the gates are closed again, and also swings out two danger signals, one for the street and one over the sidewalk."

A new system of cable line railway is to be tried in Idaho, between Hailey, the northern terminus of the Wood River branch of the Oregon Short Line, and Ketchum, a town 10½ miles distant. The pulleys carrying the cable will be above the track, which is of 3 feet gauge. The necessary power is derived from the current of the Wood River at a point where the water has a velocity of flow of 65 feet per minute. It is expected that the speed attained by the cable will be such as to take a car between the termini in one hour.

It is stated that the Cape Cod Ship Canal Company have begun night work by the aid of the electric light, and have contracted with the American Electric and Illuminating Company to supply the necessary machinery and lamps of the Thompson-Houston system for this purpose.

NORWALK LOCK COMPANY, SOUTH NORWALK, CONN.,

MANUFACTURERS OF DOOR LOCKS, KNOBS AND BUILDERS' HARDWARE.



Front Door Lock, No. X6291, Real Bronze Front, Mosaic Pattern.



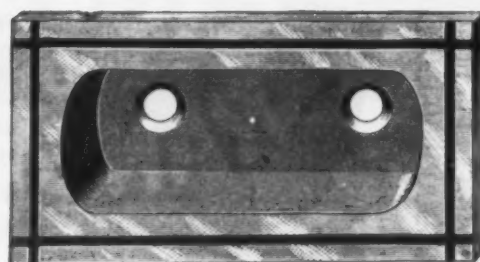
Real Bronze Escutcheon, No. 6936, Mosaic Pattern.



Real Bronze Rose and Escutcheon Combined, No. 6954 1/2, Mosaic Pattern. For Lock No. X6291.



Real Bronze Door Knob, No. 6604.



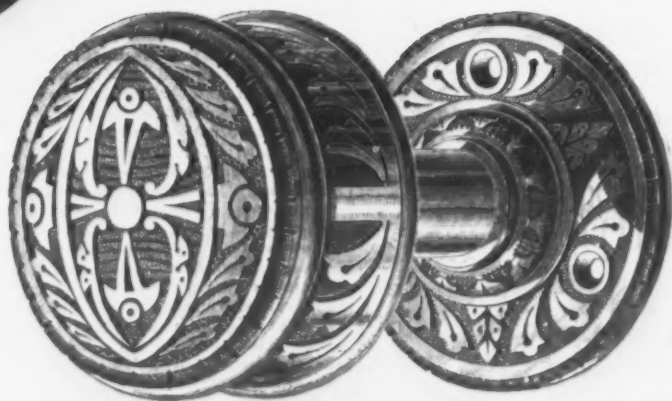
Real Bronze Flush Sash Lift, No. 711 1/2, Line Pattern.



Sash Lock, No. 4500, Frost's Patent.



Real Bronze Bell Pull, No. 518.



Real Bronze Door Knob, No. 6713.



Real Bronze Cupboard Turn, No. 3525.



Real Bronze Drop Escutcheon, No. 6896, Mosaic Pattern.

The Daft Electric Motor.

Responding to an invitation recently sent us by the Daft Electric Light Company, of this city, we had occasion to witness a very interesting trial of the Daft electric motor, held at Saratoga on the 24th ult. For some time past Mr. Leo Daft, electrician of the company, has been making extended experi-



The Names of Files.—Fig. 1.—A "Flat File."

ments at their works at Greenville, N. J., and visitors who have been favored with admittance have in almost every instance gone away fully convinced of the practical success of the system. The railway, as there worked on a small scale, some months ago, presented nothing unusual in appearance, the rails being laid in the ordinary way without any attempt at insulation, as practiced in other electric railways. Mr. Daft's method of employing a low-tension current preventing leakage to the ground. The motor, as may be expected, differs radically in appearance from the steam locomotive, its prominent features being an apparent absence of complicated mechanism and a compactness which immediately strikes the observer. The electric current, generated by a suitable dynamo

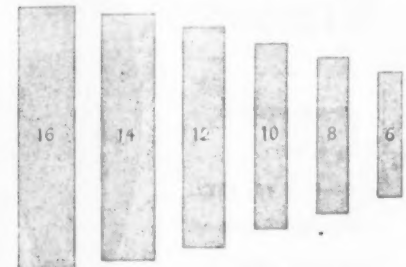


Fig. 2.—Full-Size Cross-Sections of "Mill Files."

erected at a convenient station, passes through the rails and is transmitted to the working parts of the motor in a manner which we may have occasion to describe at some future time.

The trial referred to was conducted on a short section of the Saratoga, Mt. McGregor and Lake George Railroad, which for that purpose had been provided with a central rail carrying the current, the presence of ordinary cars on the same length of track preventing the adoption of the more simple system of only two rails, as at Greenville,

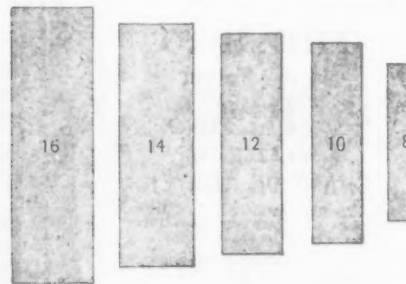


Fig. 3.—Full-Size Cross-Sections of "Hand-Files."

at the time stated. Saratoga was reached after a pleasant run of some five hours, and after a brief delay the invited guests, some fifty or sixty in number, from New York and vicinity, repaired to the scene of action, where preparations were in progress for the carrying out of the experiment. Curiosity as to the details of the system having been satisfied by an extended examination of the rails and motor named "Ampère," the latter was hitched to one of the cars of the Saratoga, Mt. McGregor and Lake George Railroad, kindly provided for the purpose, and started down the track with a load well calculated to test its capabilities.

Taken altogether, and notwithstanding

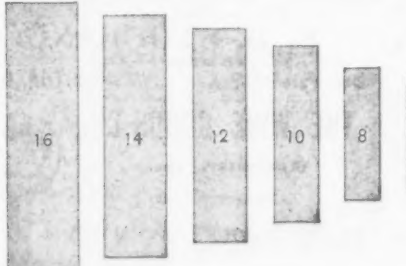


Fig. 4.—Full-Size Cross-Sections of "Flat Files."

some unfavorable incidents, the test was unquestionably successful in every respect, further interest, moreover, being attached to it from the fact of its having been the first practical and commercial test ever made in any country of an electric motor upon a steam railroad. We understand that the successful issue of the experiment has resulted in the placing



Fig. 5.—Full-Size Cross-Sections of "Pillar Files."

of an order for several motors for the road mentioned.

There is a law of New Mexico that requires all railways to use footboards in their switch frogs. They are simply pieces of wood grooved on the upper side to give room for the flanges of the wheels, and driven in between the switch rail and the main rail.

Names of Files.

The names of files are sometimes derived from the purpose for which they are to be used. Thus, we have saw files, slitting files, warding files and cotter files. The term "warding" implies that the file is suitable for use on the wards of keys, while "cotter" implies that it is suitable for filing the slots

for that class of key which the machinist terms a cotter. In other cases files are named from their sections, as in the case of "square," "round," "half-round" and "triangular," or "three-square" files, as they are often termed.

The term "flat" may be considered strictly as meaning any file of rectangular section whose width exceeds the thickness. Hence, "mill files," "hand files," and "pillar files" all come under the head of flat files, although each has its own distinguishing features. The general form of the flat file is shown in Fig. 1, while the cross-sections of various quadrangular files are shown in Figs. 2, 3, 4, 5, 6 and 7. From these views it will be seen that the thicknesses gradually increase from the mill to the square file. Mill files are slightly tapered from the middle to the point both in their width and thickness. They are single-cut, and are usually either bastard or second-cut, although they are sometimes double-cut. Mill files of both cuts are principally used for sharpening mill saws, mowing-machine knives and plows, and in some machine shops for rough lathe work, and, to some extent, in finishing composition brasswork. Mill sections are occasionally made blunt—that is to say, their sectional shape is alike from end to end—in which case they are mostly double-cut, and seldom less than 8 inches in length. They are suitable for filing out keyways,

mortises, &c., and for these purposes should have at least one safe edge. A safe edge is one having no teeth upon it, which enables the file to be used in a corner without cutting more than one of the work surfaces. When the corner requires to be very sharp it is preferable to take a file that has teeth upon its edge and grind the teeth off, so as to bring the corner of the file up sharp, which will not be from the cutting, because the teeth do not come fully up to the corner.

Hand-files are tapered in thickness from their middle toward both the point and the tang, and are, therefore, well curved or bellied on each side. This fits them for the most accurate work, on which account they are generally preferred by expert workmen. They are nearly parallel in width and have one safe edge and one edge cut single, while the face is cut double. Hand-files are also made equaling, the term equaling meaning that, although apparently blunt or of even thickness throughout the length, yet, in fact, there is a slight curvature, due to the file being thickest in the middle of its length. An equaling hand file is especially suitable for such purposes as filing out long keyways in which a great part of the file length is in action, and it can, therefore, be easily pushed in a straight line.

The flat file, Fig. 4, when 10 inches and under in length, is made taper on both its sides and edges, from the middle to the front of the file, and when longer than 10 inches they should be made full taper—that is to say, the taper should extend from the middle toward the heel, as well as toward the point. Flat files are usually double-cut, the coarse-cut being used upon leather, wood and the soft metals. The flat bastard is that most commonly used, the flat second cut, smooth and dead-smooth being used by machinists for finishing purposes, the latter preceding the polishing processes.

Pillar files are tapered in thickness from the middle to each end; the width is nearly parallel, and one of the edges is left safe. They are double-cut, and, although not in general use, are especially adapted to narrow work, such as in making rifles, locks, &c. The square file ranges from 3 to 16 inches in length, and is made for general purposes with considerable taper. It is usually double-cut, the bastard being the principal cut, the second-cut and smooth being mainly used by the machinist. Square blunt files range from 10 to 20 inches in length, of the same sectional sizes as the square taper, and are cut double, usually bastard. For machinists' use, however, they are used in the second-cut also, and are provided with sometimes one and sometimes two safe sides. Square equaling files are in every respect like the square blunt, except in the care taken to prepare a

slight curve or belly in the length of the file, which greatly enhances their value in filing out the edges of keyways, splines or mortises. The fault of the square blunt, when used for belly or true work, is that the heel, having no belly, is apt to come into too prominent action.

Warding files (Fig. 7) are made parallel in thickness, but are considerably tapered on

their edges. They range in size from 3 to 8 inches in length, progressing by half-inches in the sizes below 6 inches. They are cut double, and usually on both edges, and are mainly used by locksmiths and jewelers, and to but limited extent by machinists. Some of the warding files are provided with teeth upon their edges only, which are made quite rounding, the cut usually being second-cut, single.

Files deriving their sections from the circle are shown from Figs. 8 to 11. "Round



Fig. 6.—Full-Size Cross-Sections of "Square Files."

files" are circular in section, as shown in Fig. 8, their lengths ranging from 2 to 16 inches, and are usually of considerable taper. The small bastards are mostly single-cut, and the larger sizes double-cut. The second-cuts and smooths are rarely double-cut, except in some of the very large sizes. In imitation of double-cut, however, they are sometimes made with the first, or overcut,



Fig. 7.—Cross-Sections of "Warding Files."

very open, called "hopped," which adds, however, but very little to the cutting capacity of the file. The very small sizes—as, say, those of one-quarter inch and less in diameter—are often called "rat-tailed" files. For some classes of work—as, for instance, the circular edges of deep keyways—round, blunt files are used, their sizes running up to 16 and 20 inches, their principal cut being bastard and double.

The gulleting file is a round, blunt saw-file, and, like most other files for this purpose, is single-cut (except for a small space at the point, which is left uncut). Its principal use is for extending the gullet of what are known as gullet-tooth and briar-toothed saws.

Half-round files are of the cross-section shown in Fig. 10, and although their name implies a semicircle, yet, as generally made, their curvature does not exceed the third part of a circle. They are made taper; the bastard is usually double-cut on both sides; the second-cut and smooth is double-cut on their flat sides, and single-cut on the curve side, except occasionally in the larger sizes, when it is double-cut or hopped. Half-round files for wood usually range in size

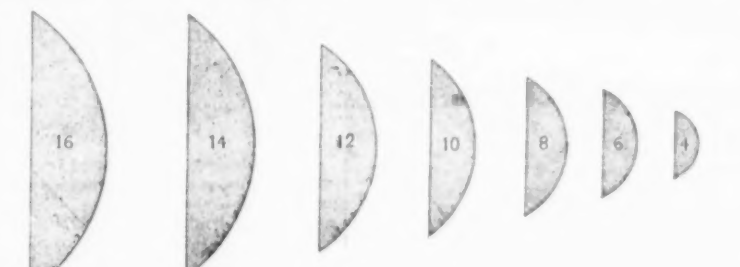


Fig. 10.—Sections of "Half-Round Files."

from 10 to 14 inches, and are of the same shape and taper as the regular half-rounds. They are cut coarse and double, and are used by wood-workers generally. Half-round rasps are also like the regular half-round in shape, the sizes usually called for being 10, 12 and 14-inch. They are used principally by wheelwrights and carriage builders, but are

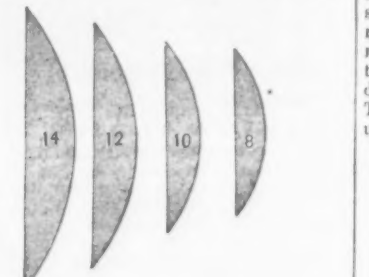


Fig. 11.—Sections of "Cabinet Files."

to some extent used by plumbers and marble workers.

Cabinet files are of the section shown in Fig. 11, being both wider and thinner than the half-rounds, the sectional curvature being somewhat less than the fifth part of a circle. They are made taper from near the middle to the point, while both the files and the rasps are made from 6 to 14 inches in length; 8, 10 and 12 inches are the sizes in most common use. As usually known the cabinet file is a bastard double-cut. The cabinet rasp is punched smooth, and both the cabinet rasp and file are rarely made of any other degree of coarseness. They are used by cabinet makers, saddle-tree, pattern and shoe-last makers, and also by gunstockers and wood-workers generally.

Three-square files are made with equilateral triangular sections, as in Fig. 12. They are tapered to a small point with considerable curve, and are double-cut. The larger sizes—say, from 10 to 14 inches—are usually bastard, and are used to a considerable extent in rolling mills. The smaller sizes are not unfrequently smooth or dead-smooth, and are used in machine shops quite generally for filing interval angles more acute than the rectangle, clearing out square cor-

ners, sharpening cutters, &c. Three-square blued files of sizes from 3 to 6 inches are sometimes made. They are mostly second-cut or smooth and double-cut, and are principally used in machine shops for filing up cutters for working metals.

Cant files, whose cross-sections are shown in Fig. 13, are usually made blunt and cut double, mostly bastard, on all three sides. These sizes are usually 6, 8 and 10 inches. Lightning files are of the cross-section shown in Fig. 14, the term lightning being known

principally by those using the saws of this name, and to some extent by those using other cross-cut, M-shaped saw teeth. The obtuse angle of this file is five-canted, while the regular cant is hexagon or six-canted, and it is found to be too obtuse for the purposes required of the saw file. They are made blunt, and range in length from 4 to 12 inches, and are cut (except for a short space near the point) single on their three sides.

Knife files are of the section shown in Fig. 15, and rarely exceed 10 inches in length, the principal sizes being 4, 5 and 6



Fig. 8.—Cross-Sections of "Round Files."

inch. They are tapered, resembling somewhat the blade of a knife, and are cut double. The very acute angle of the sides of this file makes it especially useful in filing the inner angles of the rear and main springs of a rifle lock and work of similar shape. These files are also made blunt. Cross files (sometimes called double half-round or crossing files) are of the section shown in Fig. 16. They are mostly made to order, either blunt or tapered, and



Fig. 9.—Sections of "Pit Saw Files."

usually double-cut. "Feather-edge" files (Fig. 16) are but little used by the mechanics of this day. They were formerly used in filing feather springs (as the rear spring of a gun lock is sometimes called), and also the niches in currycombs, which led them to be called by some currycomb files. The few



Fig. 10.—Sections of "Half-Round Files."

files of this kind which are now made are usually blunt and double-cut. Half-round "shoe rasps" as generally made are of the cross-section shown in Fig. 17, their sizes ranging from 6 to 12 inches, while 8, 9 and 10 inch are the most common. They are made parallel in width, but with their sides slightly tapered from the middle; the ends are rounded and cut single; the edges are safe or uncut, while the edges are usually made half-file and half-rasp reversed (¼ rasp and ¾ file, while sometimes made, are the exception). The file quarters are bastard double-cut, and the rasp quarters second-cut. This form of shoe rasp is the one in general use at this time, having almost entirely

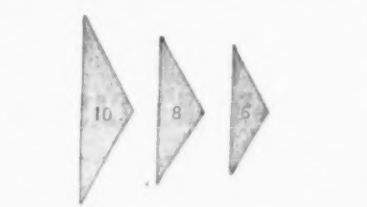


Fig. 13.—Cross-Sections of "Cant Files."

superseded the flat and swaged rasps formerly in use.

Rasps (Fig. 18), so called from their use in sharpening the knives of reaping and mowing machines, are of the cross-section shown. They range in length from 7 to 10 inches, are slightly tapered, and are cut single and on their sides only.

Tumbler files, whose cross-section is shown

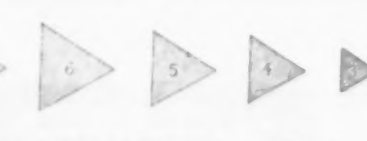


Fig. 12.—Sections of "Three-Square Files."

at A, Fig. 18, were formerly much used to file the tumbler of gun locks, but are now rarely called for. They are taper and cut double. It will be seen, however, that unless for some special purpose, the pitsaw round or half-round file will be found to answer the same purpose as the tumbler file.

Labor Statistics.

The Ohio Bureau of Labor Statistics has recently published reports from 33 points in the State, showing the average earnings of workmen who were heads of families to

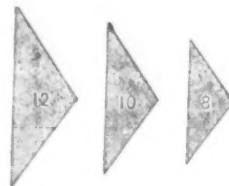


Fig. 14.—Cross-Sections of "Lightning Files."

have been only \$640.15 in 1881, against \$656.81 in 1880, while the family expenses increased from \$532.06 to \$560.79. Thus, the cost of living increased about 5 per cent. Only laborers, and not foremen, are included in this estimate of earnings, and the assistance of others in the family is counted in.



Fig. 15.—Cross Sections of "Knife Files."

The statistician notices a marked growth of discontent among working people in 1882, and attributes it solely to the rise in the cost of the necessities of life. The report also shows that of 22 strikes in that State in 1882 only five were successful. The time lost was, in the case of iron and steel workers in rolling mills, 16 weeks; boiler-makers, 6 weeks; stair builders, 3 weeks, and cigar-makers, 2 weeks. Advances in wages ranging from 8 to 16½ per cent., without strikes, were reported in 23 occupations during 1882. An interesting experiment in the way of arbitration is now in progress among the boot and shoe manufacturers of Cincinnati,

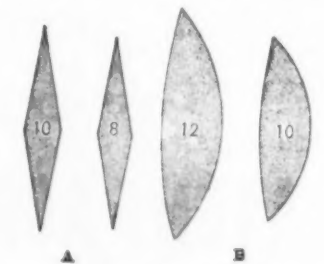


Fig. 16.—Sections of (A) "Feather Edge Files" and (B) "Cross Files."

and has thus far been a success. A "board of arbitration and conciliation" has been organized, composed half of employers and half of workmen. Before this board comes every dispute, and pending a decision work is to be continued in the shops as if nothing had happened. If the board cannot reach a decision, each side selects an arbitrator, and the arbitrators an umpire. The decision of these three is final. Each factory has a shop



Fig. 17.—Cross Sections of "Shoe Rasps."

committee, composed of the proprietor or a member of the firm and two persons selected by the employees, who hear any dispute in the factory, and if they cannot agree they refer it to the board. If an employer refuses to submit to a decision, his shop is to be declared on a strike, and if any employee so refuses he is to be deprived of work in fac-



Fig. 18.—Cross-Sections of (A) "Tumbler File" and (B) "Reaper File."

tories represented in the board. No employer or workman is allowed to interfere with anybody because he is a union or a non-union man. This organization has, in the few months of its existence, settled a disagreement in regard to the wages of shoe-cutters, and fixed a wages scale for six months.

Although the west coast of Mexico has seemed to offer a successful field for commercial operations ever since the time of the California gold discoveries, Americans find that progress in that direction is attended with many difficulties. Coastwise trade is increasing, but not rapidly. A gentleman who recently returned to New York, after visiting the principal Mexican towns on the Pacific side, represents that German houses established there control almost everything. They sell goods on long credit and at high rates of interest, taking mortgages on the growing crops as security. Even the stores for the most part are owned by foreign houses and managed under instructions. Englishmen also do well, but are less frugal and do not cater with as much success as the German rivals to the wants of the people.

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BUTCHERS' KNIVES,
BUTCHERS' STEELS,
and
SHOE KNIVES.

TRADE MARK



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AUSTRALIAN & OTHER
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GERMANY.

WORKS:--SYCAMORE ST., SHEFFIELD, ENGLAND. Established 1750.

ACKNOWLEDGMENT AND AGREEMENT.

"WHEREAS, I, GEORGE A. ROBINSON, of West Mansfield, County of Bristol, State of Massachusetts, have heretofore manufactured and sold certain Knives bearing a Mark which is claimed to be an imitation of the trade mark owned by John Wilson, of Sheffield, England, which consists of four peppercorns and a diamond, under the mistaken belief that I had the right to do so. NOW, This, is to Witness, that, in consideration of the forbearance of the Representatives of the said John Wilson to sue me for damages for the wrong aforesaid, I do hereby undertake and agree, FIRST, to surrender and deliver to the Attorneys for the said John Wilson, all knives now on hand, and in my possession, or under my control, bearing the said imitation trade-mark, and SECOND, I further undertake and agree to and with the said John Wilson, and his legal representatives, not to manufacture or sell, or cause to be manufactured or sold, at any time in the future, Knives or other Cutlery, bearing his trade-mark aforesaid, or any imitation or simulation thereof. IN WITNESS WHEREOF I have hereunto set my hand and seal at West Mansfield, aforesaid, this thirty-first day of May, 1888.

WITNESS—
E. M. REED,
(Attorney for Defendant.)

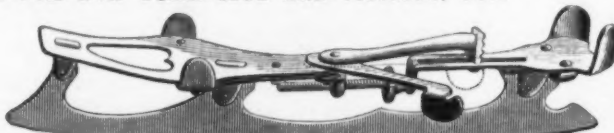
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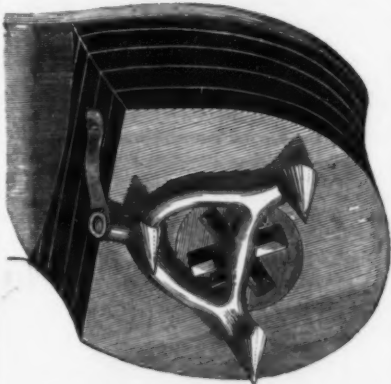
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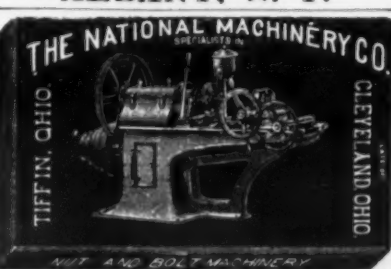


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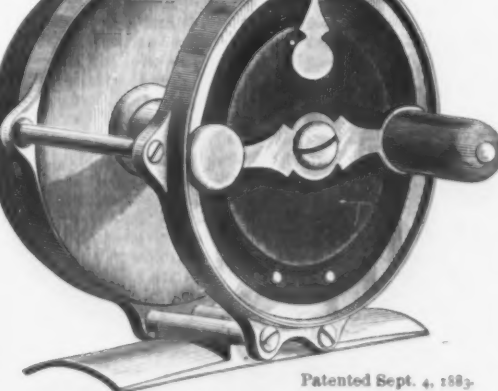
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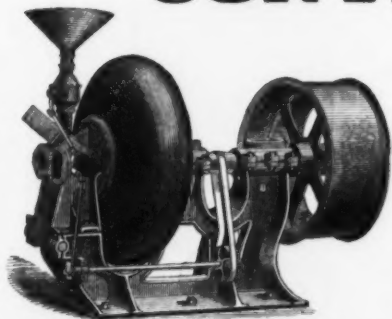
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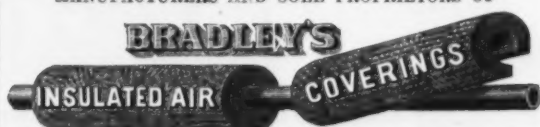
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A New Milling Machine and Gear-Cutter.

The Cincinnati Screw and Tap Company, of Cincinnati, Ohio, are building a new milling machine and gear-cutter which presents some points of interest, as will be seen from our annexed engraving. The overhanging arm supporting the outer end of the live spindle is mounted in bearings, so that it may be moved longitudinally to accommodate the length of the cutter arbor. The bearings also are so constructed as to firmly clamp it in position. The live spindle is hollow to admit a $\frac{3}{8}$ -inch rod or bar for driving out the cutter arbors or live centers, as the case may be. The shaft for the vertical adjustment of the knee is placed at an angle of 45° to the center line through the table, thus bringing its operating handle in a convenient position. The dial for the vertical feed is graduated to hundredths of an inch, while one revolution gives $\frac{1}{4}$ inch vertical motion to the knee. The rod for putting the automatic feed in or out of action runs along the front of the work-table, where it is readily accessible. The back head of the center has a revolving hollow steel spindle, with a thread on one end, to receive chucks, face-plates, &c., means, moreover, being provided to firmly lock the spindle. The table has a horizontal

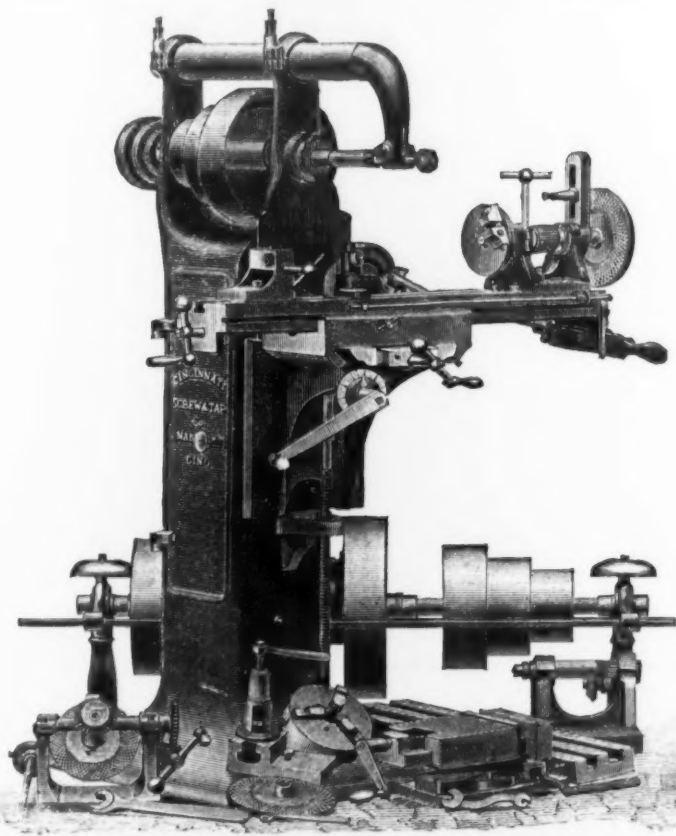
works comprise some including the new which will be capable of casting ever shops are illuminated the engines which run

rent buildings, just completed, ning out 3500 all the work electric lights, machinery furnishing the necessary power.

Manitoba Grievances.

The Manitoba and Northwest Farmers' Union organized at Brandon on Nov. 26th, for the purpose of taking concerted action to secure the redress of grievances under which the settlers suffer. The following extract from one of the speeches contains the substance of the discussion and reflects the feelings of the meeting:

"We have met together to make a solemn, united and vigorous protest against the high-handed policy of the Dominion Government toward this Province. When Manitoba entered the Confederation it was upon the condition that it should enjoy equal rights and privileges with every other member of the Dominion. Have we enjoyed, are we enjoying, those rights and privileges to-day? I answer emphatically, No! Every Province except Manitoba has control of its lands, timber and minerals, which are solely for the benefit of those provinces. This right



New Milling Machine and Gear-Cutter.

motion of 14 inches, and is provided with automatic feed stop motions. The vise can be swiveled to any required angle, and has 7-inch jaws, $1\frac{1}{2}$ inches deep, opening $3\frac{1}{2}$ inches. An extra attachment is made for cutting racks. A tool block and post may be mounted on the table and the machine used as a lathe. It is substantially and well built, and will undoubtedly find a large field of usefulness.

Extinguishing Fires on Shipboard.—There has recently been invented a new method of detecting and extinguishing fires and preventing spontaneous combustion in ships. It consists of a system of communication from the deck of the vessel with all the compartments of the ship, and with different parts of the compartment, if necessary, by which air or gas may be either sent down into the compartments or brought out at will, thus enabling the detection of fire by the smell of the outgoing vapor, or by its appearance to the sight; and also the extinguishing of the fire by introducing carbonic-acid gas, or other extinguishing matter, and preventing spontaneous combustion by causing the gases generating in the hold to escape. The apparatus for carrying out the invention consists of a system of pipes extending throughout the ship in all directions, branching from one inlet and outlet, and being perforated so as to discharge or receive the vapors into and from any part of the ship. There is also a blower, contrived either for blowing in or exhausting from the pipe, connected with a reservoir to be charged with gas, for extinguishing the fire, and being so connected with the pipe that the gas may be forced into the ship. Judging from the manner in which this invention is applied to vessels, it will doubtless prove very effective in preventing the spread of many fires that now, through inability to detect them, result in the destruction of much valuable property. This system is also applicable to warehouses where the goods are so closely packed as to prevent free access to the different parts of the building.

The Grand Trunk Locomotive Works.—The various buildings of the Grand Trunk Locomotive Works cover an area of about 10 acres, being among the most extensive in Canada. Of the men employed 1115 are in the locomotive shops and 618 in the car shops, so that the total number at present is 1733. The locomotive shops are the most extensive in Canada, and do the whole work of the Grand Trunk Railway from Quebec and Island Pond to Sarnia, with the exception of the Great Western Division. This work includes the building as well as the repair of locomotives, for the Grand Trunk have bought no locomotives since the time of the change of gauge, some 10 years ago. The works are capable of turning out 50 new locomotives every year, and a repaired engine every day. Last year 42 new locomotives were built; this year the number of new locomotives turned out will be 30. The

is denied Manitoba alone. All she receives is a paltry subsidy, which is barely sufficient to pay a twentieth part of the cost of administering the affairs of the Province. Again, a most grievous burden has been imposed upon us in the shape of an increased duty on agricultural implements. If agricultural machinery is wanted in any part of the world, it is urgently needed here. Our paternal Government has taken advantage of our necessities to oppress us with an iniquitous imposition. What is the result? The struggling pioneers of this country are already on the verge of bankruptcy, if not utter ruin. Another form of torture inflicted upon us is the hideous railway monopoly, which is to bind us hand and foot for 20 years. The vetoing of the railway charter is one of the most shameful instances of tyranny ever imposed upon a free people. What is the remedy for this disastrous state of things? We must have control of trade relations with foreign powers, and no monopoly must have more than justice from Manitoba. It is all very well to talk of loyalty to the Dominion, but we must be loyal to ourselves and our families, and I fail to see how we can be loyal to ourselves and them if we any longer submit to the arbitrary and despotic Government by which we are at present controlled. I do not wish to be misunderstood. I am no annexationist, and should be sorry to see Great Britain despoiled of any part of her provinces, but if the oppressive rule of Ottawa is to continue longer, I fear that the secession of this Province from the Dominion of Canada will be inevitable."

Cost of Locomotive Power.—The cost of locomotive power on the Grand Trunk Division of the Grand Trunk Railway of Canada, says the *Railway World*, was 12.06d per engine mile in the first half of this year, as compared with 11.62d per engine mile in the first half of 1882. The loss of engine power, owing to delays on the entire line, from snow, &c., during the first four months of the past half-year, as compared with the corresponding period of 1882, amounted to the use of 37 engines per day, continuously, for each 24 hours. The total increase in the cost of locomotive power in the first half of 1883, as compared with the corresponding period of 1882, was £37,406, or 13½ per cent. As illustrative of the increased difficulties entailed by the greater severity of the winter, it may be stated that engines employed in working snow-plows and ice-breakers ran 58,021 miles, as compared with 5427 miles in the half-year ending June 30, 1882, showing an increase of about 970 per cent.

According to the *Denver Journal of Commerce*, the Denver and Rio Grande Company are contemplating the manufacture of steel cars in the near future. A sample car will soon be commenced at their shops in that city. It is intended to heat the car by steam and light it by electricity.

"YALE" and "STANDARD" LOCKS,

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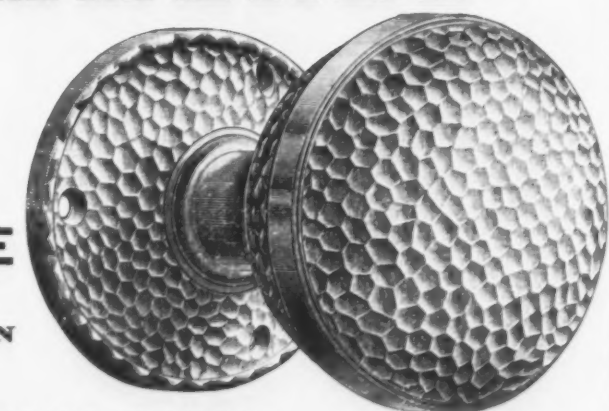
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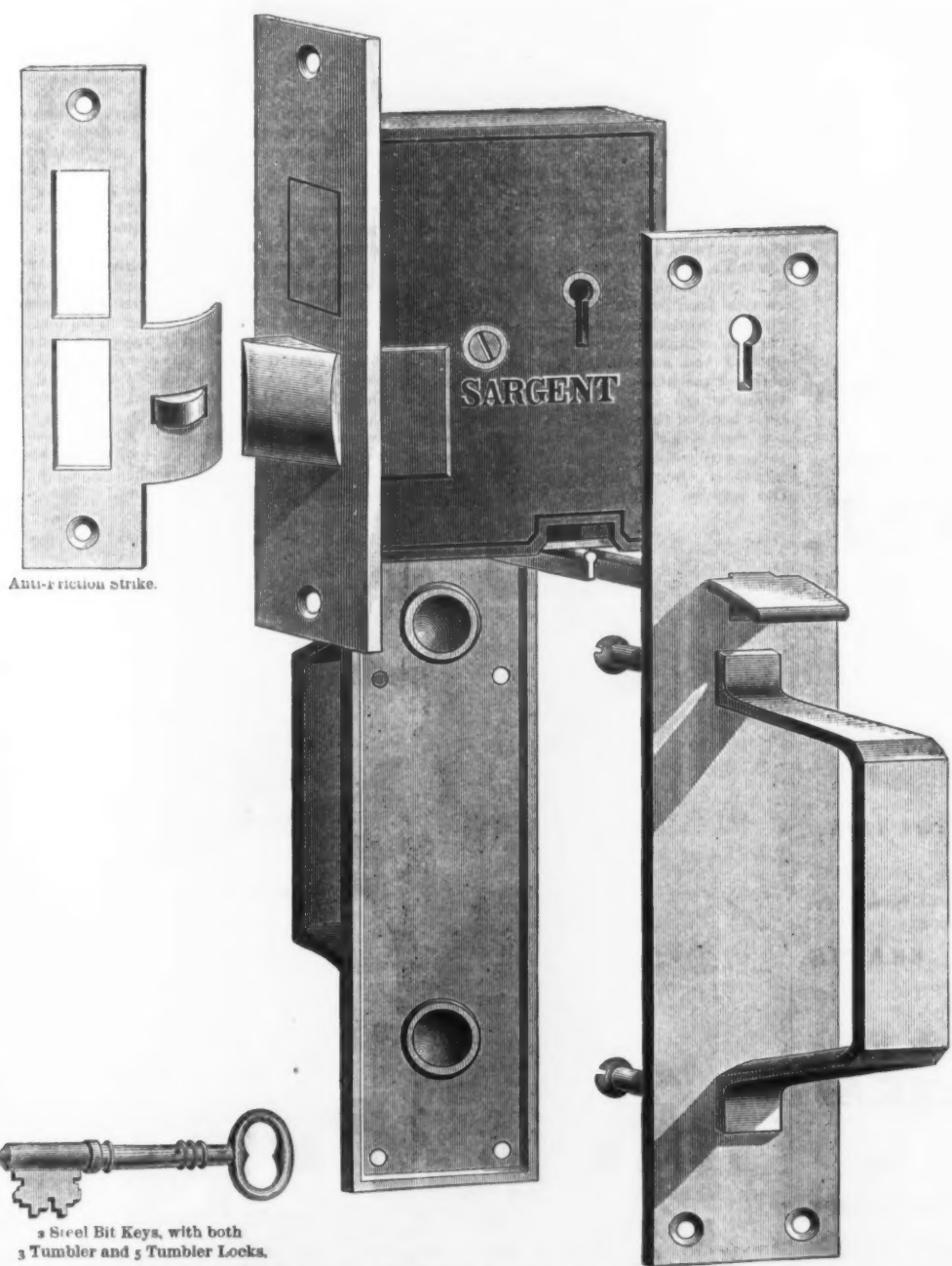
NEW YORK, 62 Reade Street.

BOSTON, 224 Franklin Street.

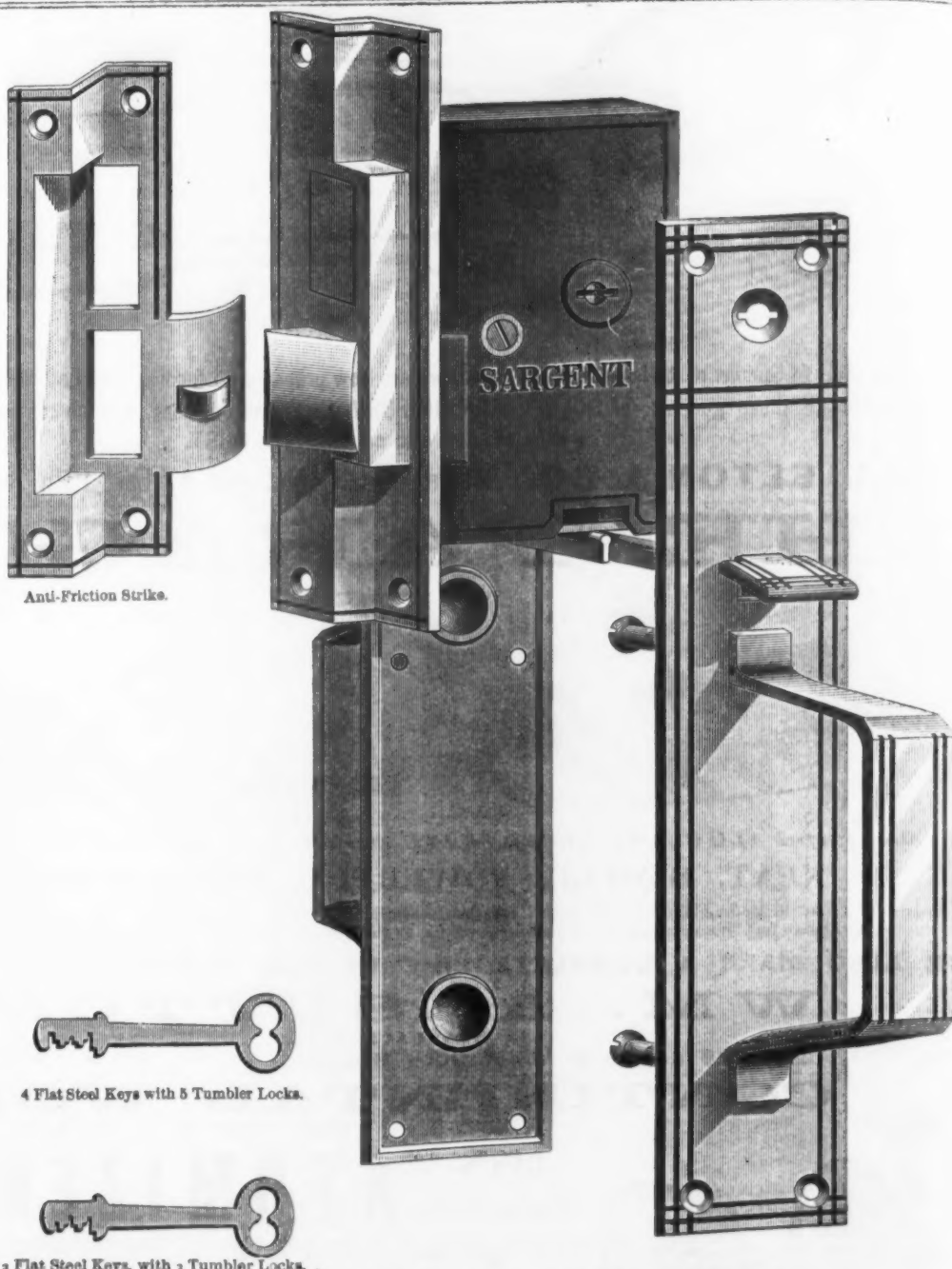
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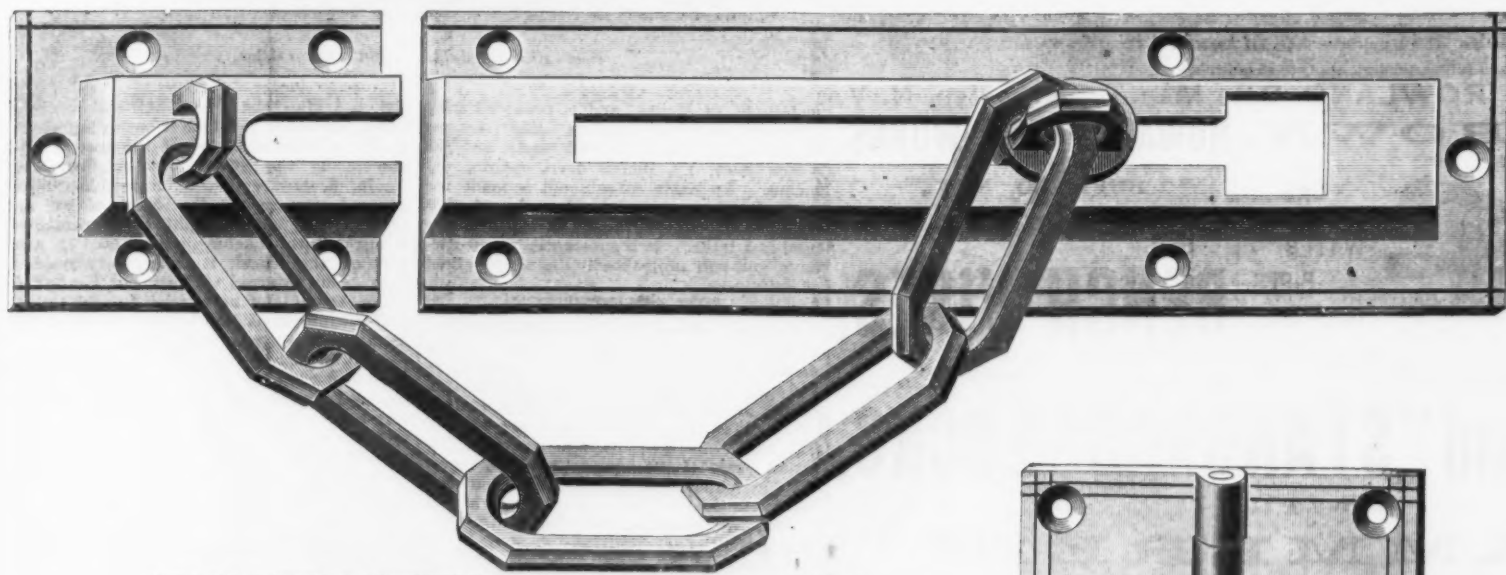
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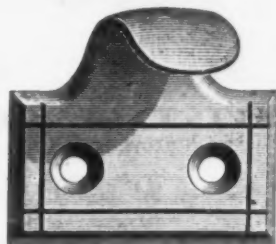
STORE DOOR HANDLES. Not Lined. Plain Front. Bit Keys.



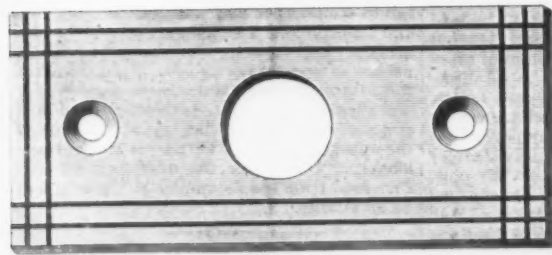
STORE DOOR HANDLES. Lined. Rabbeted Front. Flat Keys.



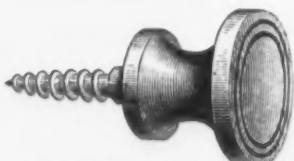
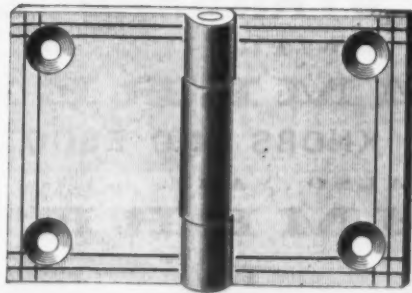
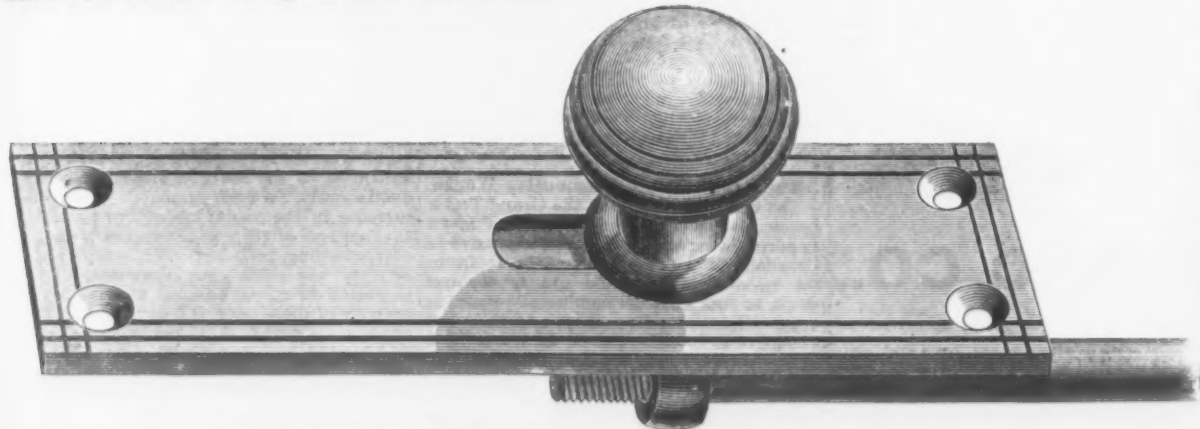
CHAIN DOOR FASTENINGS. No. 126, Not Lined. No. 136, Lined.



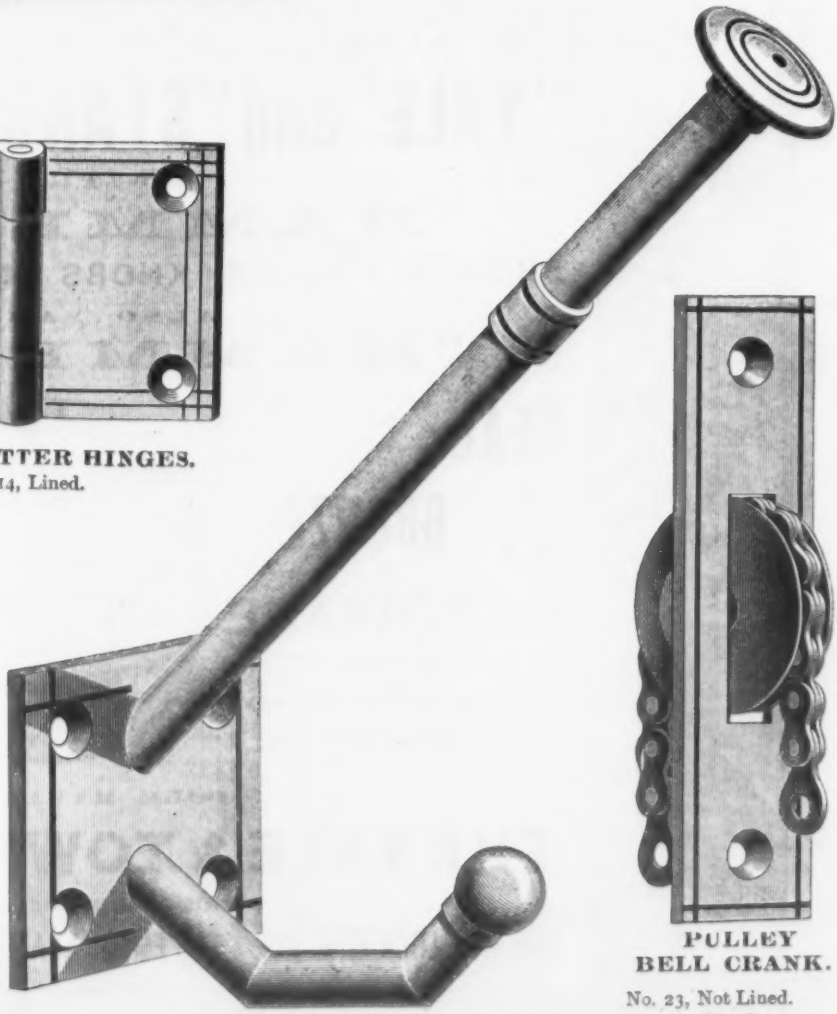
SASH LIFT. No. 833, Not Lined. No. 834, Lined.



Sash Pull Plates. No. 803, Not Lined. No. 804, Lined.

SHUTTER KNOB.
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Recent Improvements in Cowper Stoves.

Mr. Edward A. Cowper, in a paper read at the Middleboro' meeting of the British Iron and Steel Institute, says:

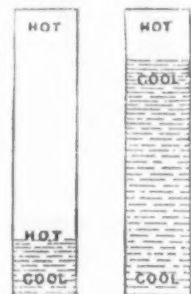
The late Mr. Neilson, by his admirable invention of heated blast for blast furnaces, effected a considerable improvement in the action of the furnace. He began with an increase of temperature of only 60° to 100° F., and finding the furnace work better, and an economy of fuel effected with even this small addition of heat, he raised his temperature gradually to 600° or 650°, with a continual decrease in the consumption of fuel for every increase of temperature. Pipe-stoves having since been considerably improved, 900° and sometimes 1000° F. is now reached, but at these temperatures the limit of the endurance of iron pipes has been reached, thus putting a stop to further economy with the old form of apparatus. For this reason further increase of temperature was not practicable, and this point was considered by some to be the natural limit to the temperature of the blast, although the maximum economy had by no means been attained. Now, although no ironmaster would deny the advantages that had been attained by hot blast (that is to say, of the temperature which he had himself reached), yet, when the invention of the fire-brick stoves offered the means of still further carrying out the same principle, opinions adverse to an additional increase were expressed. It has taken some years entirely to overcome such a prejudice, and to show that there is no natural limit except that of the temperature that can be attained by the combustion of the waste gases. That economy does not suddenly stop at 1000° F., but continues to rise, in a steady curve, for some distance beyond this point, with every increase in the temperature of the blast, is not a matter of mere theory, but has been amply proved by extensive experience, as I will presently show.

I should here mention that my friend Mr. Neilson urged me, as strongly as he well could, to go on increasing the temperature of the blast as far as was practicable and convenient, and I venture to assert that had he started in the first instance with fire-brick stoves, one would never have heard of 1000° being a natural limit to the temperature of the blast for a blast furnace. With good fire-brick, instead of cast iron, as the material to withstand the heat of the flame, the waste gas from the top of the blast furnace may be allowed to burn freely and produce the highest temperature of which it is capable, imparting its heat to the fire-brick surfaces of the regenerator without fear of damage, the regenerative system (first introduced in the Siemens furnace) enabling the heat so stored to be afterward taken up by the blast. As in the case of Neilson's first experiments, so with the early experiments with fire-brick stoves, the greatest advantage was not fully obtained at first, but the system was gradually developed by various improvements introduced from time to time. Thus the temperature of blast obtained by the Cowper stoves has been gradually raised to 1500° F., with the most satisfactory results in economy of fuel and increase in the "make."

When I first began to contemplate improving the temperature of the hot blast, in 1857, a very common temperature in this district was between that of cutting lead and cutting zinc. Antimony, which I now use, had not been thought of. The late Mr. Vaughn took me down on an engine to Exton to show me what he was doing in the way of hot blast, and explained to me that he would not heat his stoves with gas for fear they should be ruined, but used a mild coal fire instead, while he would not allow the temperature to be raised above that of melting lead. We tried the temperature with lead, and it would not "cut" it, and Mr. Vaughn then told the man in charge that he might go to the temperature of cutting lead, but he would not have it touch that of zinc. I have mentioned that the Cowper stoves are based upon the principle of the regenerative furnace introduced by Sir William Siemens, the original inventor being Mr. Fred Siemens. This is now so generally understood that it is needless to enter into a long explanation of the regenerative action; but I would beg those who are not intimately acquainted with the subject to bear in mind that the regenerator is not simply a mass of brickwork, alternately heated and cooled, but it is also a mass the top of which is always as hot as the gas flame can make it, and the bottom always cool, while between the two there is a zone of gradation, which is near the bottom when the stove has completed its turn on gas, and commences its duty of heating with blast, and near the top when its turn at the latter duty is completed. The appended diagram, Fig. 1, shows clearly the changes that take place in the temperature of the regenerator. The smallest fire-brick stove ever made is the one that stands before you; it was only made for the table to explain the action of regenerative furnaces. The interior is only 6 inches in diameter, and the depth of the regenerator is only 12 inches. It is composed of a mass of clean, broken tobacco pipes. On heating it for three hours with a gas flame, the top became just milk warm, and yet when cold blast was turned in at the top it cut lead well as it issued as hot blast at the bottom, having only traversed a regenerator 12 inches deep, as just stated. This thoroughly proves how perfectly a regenerator works when heated at one end and cooled at the other by the introduction of cold blast.

The stoves are constructed of wrought iron to retain the pressure of the blast, with a lining of fire-brick to retain the heat and protect the plating. I may add that I also invented, about the same time, the wrought-iron pipes lined with fire-brick for conveying the blast, which have since been so universally adopted for pipe-stoves as well as for fire-brick stoves. Mr. James Young very early took licenses for the Cowper stoves for heating steam and gas for distilling purposes. A pair of small experimental stoves for one tuiere were put to work by Messrs. Cochrane at their works at Ormsby; they were heated by coal fires and gave a temperature of about 1200° F. These stoves were cylindrical, the whole area inside the fire-brick lining being taken up by the re-

generator. The products of combustion, from a fire in a chamber below, passed upward through the regenerator and out through a chimney at the top. This first experiment was quite sufficient to prove that the plan was right, and a saving of fuel equal to about 5 per cent. was attained. In the first form of full sized stove constructed for heating by gas, a central circular tower or flame-flue acted as a combustion-chamber, and conveyed the products of combustion to the top, where they passed over into the surrounding regenerator, through which they descended. Various forms of regenerator-fillings were tried in the early stoves, the passages being made to break up the currents continually. Some choking occurred occasionally. At one time Messrs. Cochrane fired some stoves with gas from Siemens gas producers to avoid the dust; then some large chambers containing a series of shelves to catch the dust were used, the gas passing through them on its way from the furnace to the stoves. By later improvement, however, the necessity for any



Recent Improvements in Cowper Stoves.—Fig. 1.—Diagram illustrating Changes of Temperature in Regenerator.

such apparatus has entirely been done away with. In the early stoves the height of the regenerator was very small, and the system of regenerator-filling was like that first adopted in the Siemens furnace, in which a continual splitting of the currents took place, the air and gas being compelled to take a tortuous course. The bricks were in some cases only 1½ inches apart, and there was some liability to choking by the dust. Further experience showed it to be better to make the stoves considerably higher and with larger passages. I may add that Cochrane & Co. early appreciated the advantages of the stoves, and have applied them with great energy.

Although it is my intention to adhere strictly to the subject of this paper, I may mention that in 1865, or seven years after I

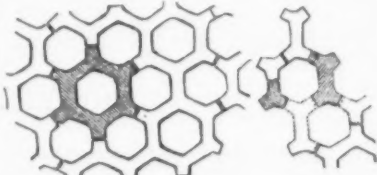


Fig. 2.—Section of Brick.

had introduced my invention, my friend, the late Mr. Thomas Whitwell, explained to me the modification of my invention which he wished to be allowed to apply. I therefore granted him a license, and all stoves that he erected up to 1871 were made under a royalty. Mr. Whitwell at first intended to make the stoves square or oblong, but I persuaded him to make them round, as being far stronger and cheaper. The "box plan," which is a peculiar arrangement of "split" brick set on edge, was then adopted, each course of each passage being, in fact, a square box formed of four bricks. These passages reached from top to bottom, so that a brush or chain could be passed down if required, while the arrangement of the bricks was such that, though standing on edge, they could not fall over or get out of place, on account of the support which they derived from each other, as each brick had, in fact, two other bricks as buttresses to it. These

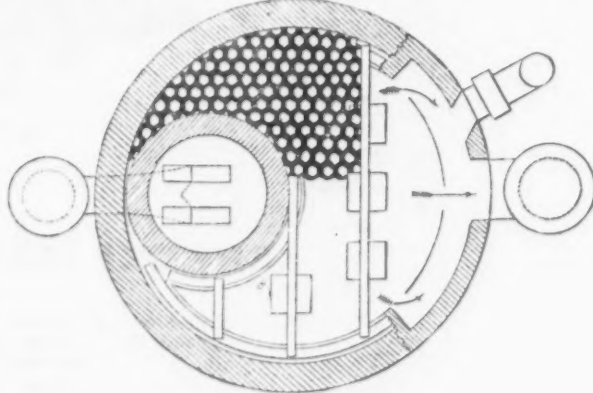


Fig. 3.—Sectional View of Stove.

passages were at first built with the bricks in one course projecting about ¼ inch over the side of the next course, so that a slightly zigzag tendency was given to the current passing through each passage, but this has been found to be unnecessary. The specific heat of fire-brick is so high, being about twice that of copper, weight for weight, that I have often speculated as to how thin I could make the sides of my passages through the "regenerator," and I long since took note of the fact that in certain early stoves, where I had the sides of the square passages only 1¼ inches thick, there was enough material to take up the whole of the heat passing into the regenerator for three hours, and I have for a long time used bricks only 2¼ inches thick, and some only 2 inches thick, though for long bricks the makers prefer the greater thickness as being safer in handling and knocking about.

The great objection to having the sides of the passages thicker than necessary is that the middle or heart of the fire-brick never gets thoroughly heated, as there is not time or it, and then, when the cold blast enters

at the bottom of the stove, and in rising has become warm and then hot, and should have the highest temperature given to it at the upper part of the stove, it finds some of the heat that was deposited on the surface of the brick then soaking in, or, more properly speaking, being conducted into the heart of the fire-brick, thus not giving the highest temperature to the blast. The same thing takes place in the reverse order when the stove has become partly cooled and the products of combustion are passing through and heating up the stove; some of the heat from the inside or heart of the fire-brick comes out if it is thick and the products of combustion are not properly cooled down, and heat is thus lost. Three inches of fire-brick is certainly a greater thickness than is necessary. I would here venture one word of caution as to the mode of registering the temperature of the blast in pipe stoves and in Cowper stoves respectively. The temperature ought always to be taken with the copper ball and pint of water (Siemens's pyrometer), as that is the only accurate way I know of under the varying circumstances of difference in the temperature of the air in a tuyere-house. Hobson's pyrometer is a very handy instrument for rough observation, but it is easy to deceive oneself, and I know that people have deceived themselves by not considering how much hotter the air in a tuyere-house is on a very calm day, or on the leeward side of a furnace, than what it is on a cool day, or on the windward side; and as the air that enters the instrument ought to be cold, or at the ordinary temperature of the atmosphere, a large quantity of hot air entering the instrument makes the reading of the temperature of the blast far too high or much higher than it really is.

I have, however, now arranged a brick of very strong form, only 2 inches thick (shown in Fig. 2), and so shaped that one brick makes three separate passages of 6-inch or 7-inch hexagons with slightly-rounded corners, so that, although the bricks cost rather more, there are not nearly so many used. As they can be pressed out with a common "steam drain-pipe press," and cut off to length, I shall soon get them made very cheaply, and thus have their sides to the passages, and passages of any size I may wish. They may be built up to any height in a stove, and make excellent work when set dry, so that no straining of the wrought-iron casings can take place. Of course, it will be seen at once that both sides of every 2 inches of thickness are heated, so that the heat has only to penetrate 1 inch from the surface in order to heat the whole. I call this "honeycomb filling." Fig. 3 shows a section of a stove through the flame-flue, regenerator and chimney-valve, the arrows indicating the direction of the draft through the stove when being heated by the combustion of gas. The regenerator occupies the whole of the space outside the circular flame-flue, but parts are removed to show the construction of the grids, girders and piers carrying the regenerator. Some of my stoves in America have bricks made in the form of solid hexagons with a round hole in the middle, but when these hexagons are put together the heat never gets to the outside of the bricks at all, so that there is much more than one-half the whole surface lost as heating surface. With a view to increase the power of the stove, I am now arranging to draw off the products of combustion from several points opposite to the circular flame-flue, which is placed opposite the chimney-valve, so that the distances through the various parts of the regenerator are, as near as may be, always the same, thus causing a more perfect distribution of the products of combustion in going out, and of the cold blast in coming in, the power of the stove being in this way somewhat increased. Another recent improvement is in the burner for the gas, which is placed in the bottom of the circular flame-flue.

I find, from numerous experiments made with gas flames of various forms, that the greatest quantity of heat is produced, and the best and hottest flame obtained, when the gas is properly burned at one place, and is kept well together as one solid flame. It then turns over under the dome, and distributes itself in the best possible manner throughout the whole area of the regenerator. The burner is formed either as a regu-

lar Argand burner, with the air up the middle and the gas up the outside, or vice versa; or, as in other cases, there are two or three large slits in the brickwork at the bottom of the flame-flue for the gas to ascend vertically in two or three flat sheets or streams, which are protected from the horizontal force of the incoming air by small piers or walls in front of the gas-slits, and then the air is admitted horizontally, so as to strike into the circular flame flue outside the sheets of gas and between them, thus presenting several large surfaces of gas and air in contact and in active motion for mixing and combustion of the best possible character. So perfect is the combustion that on a careful analysis of the products of combustion (kindly made by direction of my friend Mr. E. Windsor Richards) there was only found to be 13 per cent. of free or surplus oxygen, thus showing that the best possible use had been made of the gas. Of course, under these circumstances it is not to be wondered at that, notwithstanding the greatly superior temperature of the blast over that obtained from pipe stoves, there is always less gas

used by these stoves than by pipe stoves. With regard to the saving of fuel and increased "make," I may say that, generally speaking, the Cowper stoves save about 20 per cent. of fuel per ton of iron and increase the "make" about 20 per cent.; but in order to give as precise a result as to fuel saved as I possibly can, I have taken an exact average of all stoves (over 100) of which I have returns, and I find it to amount to a little over 5 cwt. of coke per ton of iron. In furnaces using raw coal, 7½ cwt. has been saved. In all cases the iron is rather better, being more inclined to "gray," owing to the extra heat acting as so much extra fuel. Thus 3/4 to 4/5 per ton extra profit may be made upon all the iron produced, even at the present very low prices, and this, of course, is of more importance now than it would be when large profits are being made under a high range of prices. There are now about 360 stoves at work in Europe and America, and more are constantly being put up. I have attempted to make some sort of calculation as to the annual saving to the iron trade of the world which has accrued from the adoption of the Cowper stoves, and, inasmuch as the stoves pay for themselves generally in about nine months, though occasionally it may require 10 or 11 months for an ironmaster to recoup himself, I am quite safe in taking 12 months as sufficient time to replace the outlay, and as there has now been about £160,000 expended in Cowper stoves, it follows that that is about the annual saving reaped by those ironmasters who have adopted them. The stoves have been erected in England, Scotland, Wales, France, Germany, Switzerland, Russia and America, while China and New Zealand are likely soon to be added to the list.

SCIENTIFIC AND TECHNICAL.

Artificial Ivory.

The *Chronique Industrielle*, of recent date, published an account of a new method of making artificial ivory from bones and scraps of white sheepskin. The bones are first soaked from 10 to 15 days in a solution of chloride of lime, after which they are washed in water and dried; they are then mixed with the scraps of white leather, put in a large kettle and boiled, forming a conglomerate mass of the whole, to which is added 2½ per cent. of alum. As fast as any scum or froth rises to the top it is skimmed off, the boiling being continued until the liquid clarifies. The proper coloring matter is now added and the boiling stopped. The liquid, which has now partially cooled, is strained through a cloth into a cooler, where it is left until it has hardened to such a degree that it will not pass through the meshes of the cloth. The mass is then further dried upon frames, after which it is hardened by placing in a cold alum bath for 8 or 10 hours. The total amount of alum required in the process is equal to one-half the weight of the finished ivory. The ivory, when taken from the alum bath, is washed in clear water and allowed to dry in the air. It is said that this artificial product is easily worked, and takes as high a polish as real ivory.

Manufacture of White Lead.

Some important improvements in connection with the manufacture of white lead have recently been patented in England. The invention consists in using boxes of from 15 to 20 feet long, from 5 to 6 feet wide and 1½ feet high, filled with lead in the form of wire or fine filaments and subacetate of lead, into which carbonic acid is introduced. The carbonic acid is produced in an oven or furnace, and is drawn through water to purify it and remove dust and ashes, and thence forced into the solution in the box. The interior of the box is divided into three or four compartments by deal boards extending about half way from the top to the center, leaving the lower half of the box free, so as to form an uninterrupted space. To prevent the lead wire from packing together at the bottom of the box, it is necessary to fill the box with a series of laths to keep the wires in a suspended position and always exposed to the action of carbonic acid or acetate of lead. A row of laths, 2 inches square, is placed crosswise in the box, about 2 or 3 inches from the bottom, and about ½ inch apart, so as to leave free vent for the white lead to run off, but to keep the lead wires in place. A second row of laths is then placed 3 or 4 inches higher, and according to the height of the box a third row, filling it with a kind of network, to expose every piece of lead to the carbonic acid, at the same time permitting its free passage through the box, and preventing the lead wires from settling at the bottom of the box and there packing together with white lead to a solid mass, accumulating more and more, to endanger and interrupt the whole process. At one end of the box are taps to let the lead, &c., run off into a receiving tank below the box, so that, in case of a stoppage of the oscillating motion of the box occasioned by a sudden break or by the slipping of a belt, there is no time lost in emptying the boxes. The white lead, which is kept floating in the acetate of lead while the boxes are in motion, will be thus prevented from settling down at the bottom of the box.

For the introduction of carbonic acid an opening is made in one end of the cover of the box, and for the exit of nitrogen or other kind of gas a similar opening of about 4 inches wide is made in the other end of the cover; these openings are by means of a rubber hose connected, the one with the blower and the other to a spout leading to the outside of the building. The oven is connected, by means of pipes of sheet iron 7 inches to 8 inches in diameter, with a cask filled from two-thirds to three-fourths full of water; the pipes from the oven reach so far down in the cask that they go into the water about 2 or 3 inches, so that the carbonic acid, in passing through the water, is washed and purified. Another pipe of similar size connects the cask with the blower. This pipe is of copper or such other material as will not discolor the white lead, and is connected to the head of the cask, so as not to come in contact with the water inside. By the constant influx of hot carbonic acid the water in the cask will gradually get hot, so that steam will be made and introduced into the boxes, and in order

to prevent this a constant stream of cold water has to flow in; the blower or the air pump will, however, create a vacuum above the water which will prevent the hot water from running out unless the suction occasioned by the blower is counterbalanced by the weight of the water, for which reason it is necessary to have pipes of lead inserted into the cask near the bottom, which may be raised in the shape of a goose-neck just so high that, the blower being in operation, the hot water will run off at the same rate as the cold water enters, and so keep the height of water inside the cask constantly the same. A water gauge may be attached to the cask to show the height of the water inside at any given time.

To fill the boxes with the lead, wire openings are left in the covers arranged in such a way that the box can be hermetically closed. An india-rubber hose connects the box with a vessel containing basic or subacetate of lead, by means of which the boxes may be filled with this liquid. In order to be able to see how far the boxes are filled with the subacetate of lead a small test cock or gauge is inserted into one end. The beams under the box are provided with two shafts let into the wood, fitting into cast-iron bearings, which rest on strong timber. The shafts ought to be pieces of 2 to 2½ inches square wrought iron and 2 feet long, rounded off in the middle to fit into low cast-iron bearings or pedestals about 1 foot long, 4 inches wide and 3 inches high, with an opening to fit the shaft. The apparatus being ready, the boxes are loosely filled with fine filaments or wires of lead, then set in motion; white subacetate of lead and carbonic acid are introduced until there is so much of subacetate of lead in the box that the cover of the box is washed on the under side. The introduction of carbonic acid is continued until a sample taken from the test cocks will make blue litmus paper red. The contents of the box are then emptied into a rec-iving vessel, and another quantity of subacetate introduced into the box, and so continued. The white lead is then separated from the liquid, which, consisting of a neutral acetate of lead, is made basic again, to be used in this way over and over again, while a small quantity of acetic acid is added to replace any acid which may be lost by evaporation or otherwise.

A New Insulating Material.

According to an account in *Engineering*, Mr. E. T. Truman, of London, England, has brought out a new insulating material, consisting essentially of plumbago, or black lead, mixed with gutta-percha, india rubber or ozokerit. When the gutta-percha is of poor quality the proportions are 50 parts of gutta-percha and 30 parts of graphite; but the better the gutta-percha the greater the proportion of graphite which can be used up to 50 per cent. The graphite, which must be very dry, helps, according to Mr. Truman, to preserve the gutta-percha. The black lead is chosen for its high insulation in the first place, then is carefully sifted, dried and mixed with the gutta-percha in a masticator or condenser. The resulting insulator is applied to wires by the ordinary machines for covering. Ozokerit may also be mixed with the compound in small proportion. A black-lead surface of a protective character is also given to gutta-percha wires by Mr. Truman, and its lubricating surface assists in the manipulation of the wires in pipes.

The Use of Lime Cartridges in Coal Mines.

At the meeting of the Manchester Geological Society, on November 13, a paper was read on the use of lime cartridges in coal mines, which described the process that had been adopted by Messrs. Smith & Moore, at their Shepley Collieries, Derbyshire, where the use of powder had been prohibited after a disastrous explosion in their mine. The great cost of wedging the coal induced Messrs. Smith & Moore to experiment with the view of utilizing the expansive power of lime as an efficient agent for breaking down coal, and the result had been most successful. They had been enabled to secure absolute immunity from danger of explosion of gas; greater safety in the working places, as it was unnecessary for the workmen to retire while the charges were being exploded; economy of timber, as the roof was in no way affected or shaken; a very much greater percentage of round coal; while the collier was enabled to work not only without the laborious process of breaking down the coal by wedges, but avoided the numerous accidents consequent upon their use. In the manufacture of the cartridges nearly pure carbonate of lime was used; this was compressed by hydraulic power, and the die in which the cartridges were formed was 2½ inches in diameter and 7 inches in depth. A pressure of 40 tons was applied simultaneously at both ends of the column, which was reduced from 7 inches to 4½ inches in length. The cartridge was then wrapped in paper, and was ready for use in the mine. For drilling the holes in which the cartridges were placed, a light boring machine was used, the holes varying according to the hardness of the coal, the average depth of the holes being 3 feet 6 inches, and the distance apart 4 feet 6 inches. The drilling occupied from 12 to 20 minutes, and the cartridges were then placed in the back of the hole, above uppermost; a tube having six perforations, about 4 inches apart, was inserted, the hole was stemmed up, and a quantity of water was forced in by means of a small hand-pump. The generation of steam and expansion of the lime commenced almost immediately after the water reached the cartridges, and the time taken by the lime to bring down the coal varied, according to the hardness and position of the seam, from 15 minutes to three-quarters of an hour. It had been stated that the heat produced by the slaking of the lime was sufficient to ignite gas, but this had been altogether disproved by special experiments made for that purpose.

Some useful applications have lately been made in England of luminous paint where it is desirable to render objects visible in the dark, such as life and mooring buoys, numbers of vessels, dangerous rocks and headlands, a large rock having recently been painted. Perhaps the most striking application is the painting of the mariner's compass on board ship, by which means it is rendered clearly visible, and the course can be easily kept should the lamp be extinguished.

METALLURGICAL NOTES.

Extracting Cobalt and Manganese from Their Ores.

A new process for extracting cobalt and manganese from their ores has recently been patented in England, and consists in the use of sulphate of iron for the purpose of extracting the oxides of cobalt and manganese from their ores in the form of sulphates, in which form they are easily converted into oxides by old and well-known processes. The theory of this process is to decompose the sulphate of iron in the presence of the ores containing the oxides of cobalt and manganese, so that it shall be converted into oxide of iron, and the oxides of cobalt and manganese into sulphates, in which condition the sulphates are washed out and reconverted into oxides. In practice the following method is preferred: The ore must first be crushed very fine, mixed with water to a soft paste, and its percentage of oxides of cobalt and manganese ascertained. A sufficient quantity of sulphate of iron is then added to convert the oxides into sulphates. In this condition it is boiled for half an hour, by which time the whole of the oxides will have been converted into sulphates and held in solution by the liquor in which the slime has been boiled. This solution is therefore decanted, and the thick residue of all remaining solution is washed, so as to remove all trace of sulphates, and the solutions are then treated with any of the well-known materials for reconvert the sulphates into oxides. If the slime is put into cold water and allowed to remain there, say, for 24 hours, the most of the oxides will have been converted into sulphates, but this makes the process tedious, and is not so efficacious as when the slime is boiled. Instead of boiling the sulphate of iron in the shape of a salt, it may be mixed with the dry crushed ore and heated in a furnace until the double composition above referred to has taken place. These sulphates may then be washed out with cold water and precipitated in the form of oxides, as before.

Ingot Molds.

A new form of ingot mold has been devised by Mr. Samuel Rideal, of Manchester, England, for which great advantages are claimed. The invention consists in employing ingot molds having an outer casing of metal and an inner shell of refractory material, with an annular space between the two filled with non-conducting materials. The outer casing is made either taper or parallel in form, open top and bottom and of cast or rolled metal, preferably of plates rolled of mild steel in two or more parts. To the lower edges of the casing are riveted bars of metal of angle section which project inside, and upon which stand the inner shell. To the upper edges of the casing are attached loop rings to enable the molds to be lifted and removed as required. The inner shell, of the size and form of the ingots required, is made of magnesium limestone, old fire-bricks and coke, each being exposed to a high temperature, afterward reduced to a suitable fineness, mixed with mineral oil to a stiff paste, and rammed or forced into molds of metal to the form required; the shells are then dried and gradually heated to a bright redness. Around the outside of the shells bands of thin metal are placed at short distances apart, which expand and contract with the shells when in use, and admit of their being removed without injury. The inner shell being thus prepared, is placed inside the outer casing, its lower edge resting upon the angle bars, and the annular space filled with some porous non-conducting material, the inner surfaces of the shells being protected by a wash of ground plumbago and water before being filled with molten metal. Ingot molds of something like the form described above—that is, of thin metal, lined with refractory material—are by no means a new invention, but, thus far, all trials of them have been unsatisfactory. Whether this mold of Mr. Rideal's will prove a success remains to be determined.

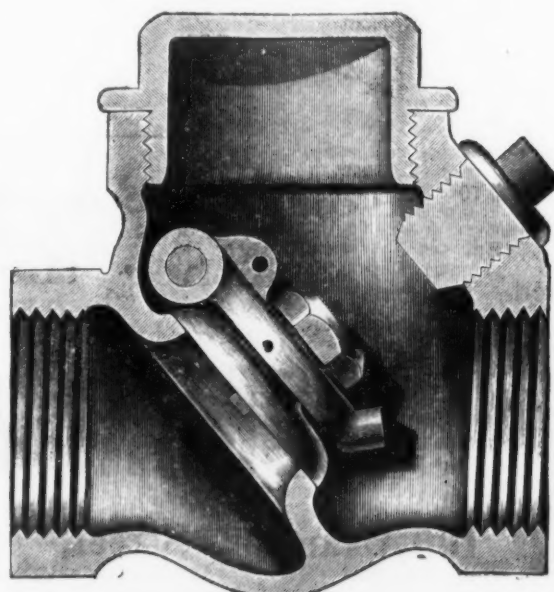
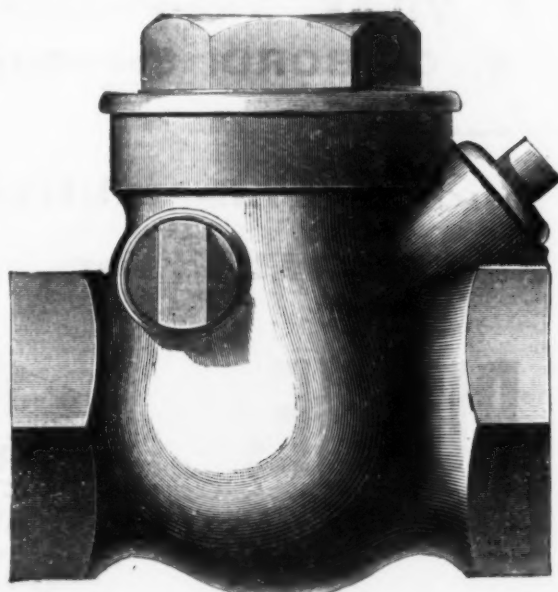
Railroads in Venezuela.—The first railroad built and operated in Venezuela began at Puerto Cabello and led to the westward. About 10 miles were built and operated, but embarrassment followed, and nothing is now to be seen except a dim outline of the road bed. About the year 1870 an English company built a 2-foot gauge road from Tucacas to the mines of Aroa, a distance of 55½ miles. Poisonous reptiles, wild animals, malaria and dense jungles combined to obstruct the building of the road. The largest bridge has a span of 90 feet. The ties, bridges and even the telegraph poles are of iron. The road for its last 5 miles has a grade of 600 feet, requiring specially constructed engines. The freight cars carry from 5 to 6 tons, and the passenger cars about 30 passengers. A road from La Guira to Caracas, a distance of 22 miles, has been in process of construction for several years. The track of the road is 3½-foot gauge. It is built on a series of reverse curves, having a radius of 140 feet. Surveys have been made for other lines, and a small amount of grading has been done on a road 40 miles long, from Puerto Cabello to Valencia.

Metallizing Wood.—A French journal thus describes a process for metallizing wood: "The wood is first immersed for three or four days, according to its permeability, in a caustic alkaline lye (calcareous soda), at a temperature of from 170° to 200° F. From thence it passes immediately into a bath of hydrosulphate of calcium, to which is added, after 24 or 36 hours, a concentrated solution of sulphur in caustic potash. The duration of this bath is about 48 hours, and its temperature is from 90° to 120°. Finally, the wood is immersed for 30 or 50 hours in a hot solution (90° to 120°) of acetate of lead." This process, as may be seen, is a long one, but the results are surprising. The wood thus prepared, after having undergone a proper drying at a moderate temperature, acquires under a burnisher of hardswood a polished surface, and assumes a very brilliant metallic luster. This luster is still further increased if the surface of the wood be first rubbed with pieces of lead, tin or zinc, and be afterward polished with a glass or porcelain burnisher.

The wood thus assumes the appearance of a true metallic mirror, and is very solid and resistant.

Pratt's Straightway Swinging Check Valve.

The difficulties attending the use of the ordinary check valves and the numerous ailments to which they are subject are too well understood by mechanics to need particular mention. They are known and appreciated wherever such valves are used, and do not need attention in describing a new form of valve which avoids them. This valve is shown in the accompanying illustrations. It is known as Pratt's Patent Straightway Swinging Check Valve, and is manufactured by the Pratt & Cady Company, of Hartford, Conn. The valve belongs to the class of swinging valves, and its seat is placed at an angle of 45°. The peculiar feature of the valve itself is that it is hung from a yoke which allows it to rotate freely on its seat, and by means of an opening, closed by a plug at right angles to the seat, it can always be ground in place by using a screw-driver, without the necessity of breaking the joints or connections. This feature enables the valve to be ground in place and rust or sediment on the seat to be removed as soon as discovered, it being merely a few seconds' work to remove the plug. The valve itself and yoke may be removed at any time by taking off a cap over it. The parts being made entirely interchangeable, a new disk can be slipped in place in case corrosion or an accident has made it impossible to grind the disk tight. Even this operation of re-



Pratt's Straightway Swinging Check Valve.—Side View and Section.

placing the valve requires but a few minutes. Where the valve is used as a check on a boiler, a stop is usually placed in front of it, or, at least, always should be, which would enable the engineer at any moment to take the pressure off from the check, grind it in its seat, or replace the disk with a new one in a few minutes' time, even while the boiler is at work. On locomotives this construction is specially valuable, since even at a station the engineer can relieve the valve of pressure by taking out the plug and grinding the disk on to the seat without causing many minutes' delay. This ease of access, it is claimed, makes the metallic seat or metallic valve quite as desirable and durable as any of soft or semi-elastic compounds used for valve seats and valve faces. The disk is held on a yoke turning on a pin and provided with a small projection having a hole in it, by which a hook can be inserted to remove it when necessary. The spindle on which the yoke swings is held in place by a hollow plug, shown in the exterior view of the valve. It will be noticed that the diaphragm in which the valve seat is formed is curved toward the opening and in the direction of the flow, so as not to present a sharp edge to the water. A very desirable feature found in this form of valve is that the construction gives almost a straightway opening of the full bore of the pipe. In fact, should it be necessary, it is easy to have a valve of this style made which shall give the straight opening the full size of the bore without any obstruction whatever. Another point, which is of considerable advantage, is that there is practically no friction in the opening and closing of the valve, and certainly no opportunity to stick. Rising from its seat obliquely will have little effect on the operations, since there are no straight guides to cause friction and interfere with the working. In some of its essential features this valve has been on the market as a straightway check for some time; its form, however, was entirely different from anything made in the valve line, having a straight outline and large, cumbersome plug. Its present form is that of the ordinary globe valve, and it occupies no more room, while affording all the advantages of the swinging revolving disk in the easy method of access. The disk can be made, when desired, to receive rings of Babbitt metal, leather or other substances, so that those who do not wish the metallic seats can be accommodated.

The Bransk Iron and Steel Works.

—Engineering gives the following interesting particulars relative to the Bransk Iron and Steel Works, at Orel, Russia, which are classed among the most important of that country. They were started on a very small scale in the year 1874, but have since grown to considerable dimensions. The Bessemer plant contains two 5-ton converters, and gives an output of 4420 tons per month. The open-hearth plant contains six 5-ton Siemens-Martin furnaces, and gives an output of 2250 tons per month. At present they are all making low-carbon steel. Anthracite coal is used to melt the pig, but gas for the furnaces is made from wood of all sorts—pine, beech and oak. Five hundred tons of wood

are consumed daily. The pig iron used is mostly English. The rail mills are of the Belgian type, two-high reversing. They roll the rails 90 feet, for three lengths of 30 feet each, and turn out on an average 550 ingots per day. The rolling plant consists of one universal mill, one plate mill, two small mills, and one bar mill. A new wire mill is nearly ready for use, which will produce over 32 tons per day. A large steam hammer is also being put in. There are large bridge, machine and molding shops. The smiths' shop contains 100 fires and employs the same number of smiths. Altogether, the firm employ about 9000 men.

TRADE PUBLICATIONS.

Tests of Drop Hammers.

We have just received a report of some interesting tests made for the Stiles & Parker Press Company, of Middletown, Conn., by Prof. R. H. Thurston. The tests were made on their "friction roll drop" hammer and a "crank lift drop" hammer, both kinds of hammer being in use at the works of Strieby & Ward, of Newark. Two hammers of each class were used, weighing 900 and 300 pounds each, the drop being 28 inches. The gauges used in measuring the work done by the hammers were cylinders of pure merchant copper, varying from ¾ to 1¼ inches in diameter, and from 1¼ to 2½ inches in length. The results of the test showed that the drop hammers performed respectively 2.1 and 1.8 foot-pounds of work per pound of weight of hammer, while the "crank lift" hammers gave 1.5 foot-pounds per pound of hammer. The efficiencies of the

table and rule are given at length. This, as our readers who have seen the article in *Mechanics* know, gives a short method for the calculation from a card of the steam consumption for horse-power. Mr. Brown's drum-spring testing apparatus is illustrated, and a very good description given. A new locomotive revolution counter is shown, of which very good reports come to hand. As this has a convenient starting and stopping apparatus, it is very handy to work in a position where convenience is one of the indispensable elements in handling any piece of apparatus. Several pages are devoted to Amsler's polar planimeter, which is made by the company in three different styles. One part of the apparatus gives the area in inches and fractions, while the more improved form not only calculates areas, but also gives the average height of the diagram.

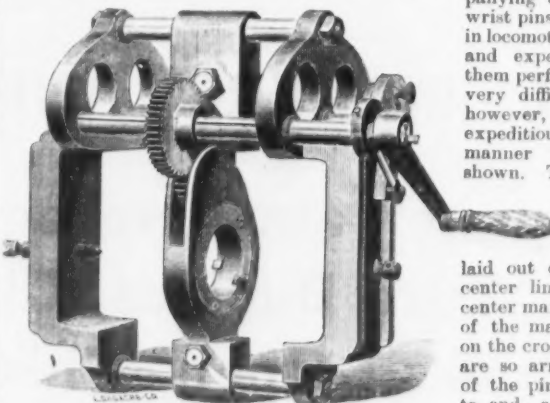
Wood-Working Machinery.

Messrs. Rowley & Hermance, of Williamsport, Pa., send us their catalogue of improved wood-working machinery. The book is a quarto of nearly 75 pages, handsomely printed, with red-lined border and illustrated with excellent woodcuts. The various specialties manufactured by this firm, which embody a full line of wood-working machinery, are clearly shown and carefully described. One peculiarity in the construction of the machine shown is the use of the firm's patented adjustable journal box. Numerous testimonials from parties who have used the machinery and tested this box are presented. The box is in the general shape of a V, with the shaft at the angle. It consists of three parts. The caps are

tightened by simply loosening two bolts which hold them in place, and setting down an adjusting bolt in the end of the cap. The caps being adjustable in this manner to the wearing of the box, the manufacturers claim that the journal can be kept central and tight until the box is worn out, thus preventing all heating and trembling or jar of the shaft, frequently met in connection with wood-working machinery.

Wood-Workers' Specialties.

We have received from Messrs. Shimer & Co., Milton, Pa., a catalogue and circulars describing the Shimer cutter-heads for flooring, siding, doors, sash, blinds and other similar work. In this tool the bits are arranged in two series—upper and lower—which cut alternately, each pair completing a full cut across the edge of the lumber, producing either tongue or groove. The bits are secured to seats alternately arranged, so placed as to insure a slanting cut, giving the clearance at the side, so that no part of the bit, with the exception of the cutting edge, comes in contact with the lumber. This peculiarity of construction gives these goods



Wrist-Pin Lathe.

their widespread reputation for light and easy running. In the circulars illustrations are presented showing the work produced by these cutter-heads, directions for ordering, patterns of knives and other items of similar information useful to managers of planing mills. Another specialty illustrated and described is Shimer's variety molding machine, which embodies some peculiarities of construction. The counter-shaft is built upon the base of the machine, and the whole is arranged in such a way as to combine great strength and durability. The mechanism for raising and lowering the spindle is within the upright of the machine that supports the table and is operated by a hand-wheel. The parts working the shipping lever are in the nature of a T, and are so placed as to be moved to the right or the left, as the case may be, with the foot, leaving the operator's hands free to move his work to the cutter. Directions for operating this machine, descriptions of a reversible cutter and a large number of molding patterns are presented.

LATEST LEGAL DECISIONS.

PARTNERSHIP.

C and his brother were partners, and they took with them two persons, dividing the interests as follows: To the brothers, three-eighths each, and to the others one-eighth each. By one of the articles, the losses, expenses and profits were to be borne and divided in the same proportions, but the next article declared that it was agreed "that in the event that the net profits of the business in any one year should be so small that the portion of W and A, the one-eighth partners, should not amount to \$2500, exclusive of their interest on their unpaid capital, then it is agreed that their accounts shall each be credited a sum sufficient to make that amount, unless such deficit should occur from losses outside the ordinary business of copartnership." The C's demanded from W and A their one-eighth of all losses, and the latter answered that the sum of \$2500 each was guaranteed them, and that, therefore, they were not chargeable with losses beyond a reduction of their profits to \$2500. In this case—Welsh vs. Canfield—the Court of Appeals of Maryland reversed the decree below, which was in favor of the C's. Judge Ritchie, in the opinion, said: "Partners among themselves may agree as to the proportions of profits and loss to be taken or borne by different members of the firm. In this controversy there is no real conflict between the articles stated. If W and A are to be credited such sums as will be equivalent to their realizing a net profit of \$2500 each, whatever sums may be necessary to do this is clearly, we think, the sums they are entitled to receive and have the benefit of. To credit them with \$2500 each, when such sums are not enough to put them in the same position as if they had made net profits to that amount each is simply to contribute a certain sum toward reducing the losses of each, and not to supply a substitute for gains unrealized."

MASTER AND SERVANT—SAFE MACHINERY—NOTICE.

A workman first employed as a "helper" in a manufactory was put to operating a spitting saw, which was without a guard, and he was injured and sued his employer for damages. This saw was one of the most dangerous machines in the factory in the hands of a workman without the proper experience. The superintendent said to the plaintiff that P, another employee, would show him how to use the saw, but P gave him general directions only, and added: "Look out and don't get cut." The point on which the case—Wheeler vs. Wason Manufacturing Company—turned, in the Supreme Judicial Court of Massachusetts, was whether or not sufficient notice had been given the plaintiff as to the risk he was taking in operating the machine without a guard. Judge C. Allen, in ruling against the company, said: "1. We cannot say that the jury would not be warranted in finding that the saw was in an unsafe and improper condition for the plaintiff, a beginner in the use of such machinery, to be put to work upon. The refusal to rule that the defendant was not bound to provide a saw with any guard or protection rests upon the same ground. It was a question of fact what protection should be afforded, or whether any guard was reasonably necessary. 2. As to the question of a due and proper warning notice: The servant does not assume and is not to bear the risk of unknown and undisclosed perils, but he is held to take those risks which he knows, or which, by the use of ordinary care, he ought to learn to be incident to the nature of the business in the place and manner where it is carried on. The master's duty is to provide machinery which is reasonably safe and proper; and if the use of it is attended with special peril, such as his servants ought to know, and if there is, accordingly, under the circumstances of the particular case, a duty resting upon him in respect to giving notice to the servants of such special peril, that duty is not discharged by delegating the performance of it to a third person."

A Portable Wrist-Pin Lathe.

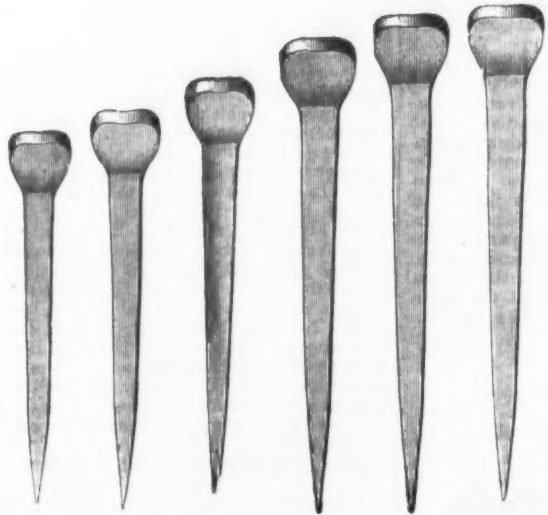
The L. B. Flanders Machine Works, of Philadelphia, Pa., have favored us with particulars relative to their patent portable wrist-pin lathe, which is shown in the accompanying engraving. The turning of wrist pins, when cast or forged solid in locomotive cross heads, is a laborious and expensive process, and to get them perfectly round and in line is a very difficult operation. The work, however, can be accomplished very expeditiously and in a satisfactory manner with the appliance here shown. The operation of the machine will be readily understood. The center marks on the outside of the cross-head are first laid out exactly opposite where the center line is wanted, and on these center marks are screwed the centers of the machine. After being placed on the cross-head for work, the cutters are so arranged that the whole length of the pin can be turned from end to end, and as true and smooth as though turned in a lathe. The advantage of having a true cross-head pin, the work, moreover, being done in a very short time, makes the tool very desirable. It is built in several sizes, to meet the wants of the trade, and the standard size takes a great range of locomotive cross-heads. Each machine is also provided with all the necessary wrenches, tools, &c., for immediate use.

The reported guarantee by the Dominion Government of annual dividends for a term of years on \$100,000,000 Canadian Pacific Railroad bonds evinces an earnest desire to form a connecting link between Ontario and Manitoba, at any cost and without delay. Manitoba is a new development in the British North American system, intended to complete the unity of the Dominion in an independent existence, and despite the rivalry of the great Northwest. Although the inhabitants of Manitoba sometimes manifest a spirit of discontent, they cannot be allowed to gravitate into allegiance to the neighboring Republic.

TO WHOLESALE AND EXPORT TRADE.

SARANAC HORSE NAIL COMPANY,

Plattsburgh, N. Y.



No. 5 No. 6 No. 7 No. 8 No. 9 No. 10
26c. 23c. 21c. 20c. 19c. 18c.
PER POUND.

Either Blued or Polished.

We use **SELECTED BRANDS** only of **NORWAY IRON**, and in **QUALITY** and **Superior Finish** they are **Guaranteed** to be **Unsurpassed** in the **World**.

A. WILLIAMS, President.

S. F. VILAS, Vice-President.

W. S. GUIBORD, Secretary.



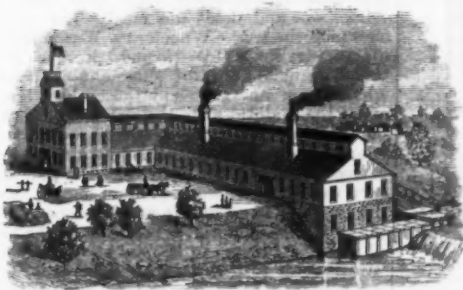
These Cuts are of

SARANAC NAILS

twisted and bent

WHEN COLD.

For Discounts and Terms address
either the **FACTORY**, or



DODMAN & BURKE,

100 Chambers Street, - - NEW YORK,

Who are **GENERAL AGENTS.**



RHODE ISLAND TOOL CO.,

SUCCESSORS TO

PROVIDENCE TOOL CO.,

MANUFACTURERS OF

Heavy Hardware, Railroad and Machinists' Supplies,

SAIL MAKERS' AND SHIP CHANDLERS' HARDWARE,

COMPRISING



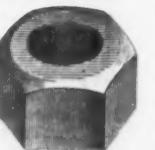
Square and Hexagon Nuts, Washers, Chain Links,

Turn Buckles, Clinch Rings, Hooks and Thimbles,

Sister Hooks, Open Thimbles, Grommets and Grommet Rings,

Grommet Knobs, Rigger Screws, Marline Spikes, Ship

Scrapers, Norcross Iron Blocks, &c., &c.

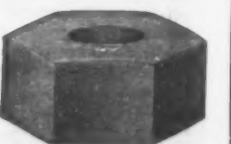


DROP FORGINGS OF IRON OR STEEL MADE TO ORDER.

CORRESPONDENCE SOLICITED.



PROVIDENCE, R. I.



The United States Foreign Trade in Coal and Metals for the Month and for Nine Months Ended September 30.

FROM THE REPORT JUST ISSUED BY HON. JOSEPH NIMMO, JR., CHIEF OF THE BUREAU OF STATISTICS.

| Articles. | Imports. | | | | Values. | | | |
|---|-----------------------|-----------------------------|-----------------------|-----------------------------|-----------------------|-----------------------------|-----------------------|-----------------------------|
| | Quantities. | | Values. | | Quantities. | | Values. | |
| | Month ended Sept. 30. | Nine months ended Sept. 30. | Month ended Sept. 30. | Nine months ended Sept. 30. | Month ended Sept. 30. | Nine months ended Sept. 30. | Month ended Sept. 30. | Nine months ended Sept. 30. |
| | 1883. | 1882. | 1883. | 1882. | 1883. | 1882. | 1883. | 1882. |
| Crass, and manufactures of..... | | | | | Dollars. | Dollars. | Dollars. | Dollars. |
| Coal, bituminous..... | 75,929 | 85,588 | 471,014 | 530,787 | 42,317 | 65,284 | 373,258 | 551,898 |
| Copper ore..... | 161,980 | a | a | a | 191,080 | 291,610 | 1,395,623 | 1,434,438 |
| Copper, other manufactures..... | 44,913 | 27,022 | 305,185 | 375,753 | 16,196 | 90,135 | 145,826 | a |
| Lead, and manufactures of..... | | | | | 4,865 | 3,121 | 38,374 | 49,256 |
| Metals, metal compositions, bronze manufactures..... | | | | | 16,292 | 30,092 | 186,539 | 230,996 |
| All other..... | | | | | 10,574 | 27,337 | 60,725 | 167,290 |
| Mineral substances, n. e. s..... | | | | | 108,408 | 218,392 | 1,764,822 | 1,463,146 |
| Iron and steel, and manufactures of..... | | | | | 137,544 | 667 | 71,224 | 55,315 |
| Ore, iron..... | 50,554 | 99,944 | 409,538 | 473,303 | 118,727 | 235,580 | 1,030,773 | 1,275,797 |
| Pig iron..... | 31,994 | 70,385 | 285,356 | 428,432 | 557,497 | 1,408,402 | 4,219,594 | 7,969,483 |
| Scrap, fit only to be remanufactured..... | | | | | | | | |
| Iron, wrought and cast..... | 4,905 | 5,670 | 41,966 | 121,531 | 73,513 | 98,108 | 681,560 | 2,286,861 |
| Steel..... | 1,370 | a | a | a | 21,719 | d | d | d |
| Bar-iron, rolled or hammered..... | 9,274,584 | 15,210,488 | 72,785,786 | 126,800,585 | 187,950 | 317,582 | 1,452,560 | 2,645,057 |
| Bars, railway..... | | | | | | | | |
| Of iron..... | 4 | 221 | 419 | 35,371 | 128 | 7,438 | 13,105 | 1,010,849 |
| Of steel, or in part of steel..... | 2,958 | 25,457 | 32,337 | 137,614 | 94,146 | 880,517 | 980,346 | 4,564,551 |
| Hoop, band, and scroll iron..... | 167 | 1,867,653 | 1,025,902 | 8,088,121 | 9 | 32,370 | 37,518 | 148,441 |
| Sheet, plate and taggers' iron..... | 2,990,323 | 4,113,630 | 12,069,074 | 17,946,404 | 109,917 | 187,932 | 387,062 | 553,708 |
| Tin plates, terne plates, or taggers' tin..... | 43,517,593 | 37,784,559 | 877,118,130 | 81,006,317 | 1,508,314 | 1,329,726 | 13,845,306 | 14,062,971 |
| Cutlery..... | | | | | 158,532 | 201,922 | 1,553,349 | 1,560,561 |
| Fire-arms..... | | | | | 160,533 | 203,881 | 969,290 | 1,217,090 |
| Machinery..... | | | | | 78,441 | 225,940 | 1,325,359 | 1,741,495 |
| Cotton ties, or hoops for baling purposes, of iron and steel..... | 8,013,045 | a | a | a | 142,409 | a | a | a |
| Hoops, bands, sheets and plates, of steel..... | 452,443 | a | a | a | 20,225 | a | a | a |
| Ingots, blooms, slabs, billets and bars of steel, and steel in forms, n. e. s..... | 1,738 | a | a | a | 123,197 | a | a | a |
| Wire rods, (rivet, screw, nail and fence), round, in coils and loops, of iron or steel..... | 10,232,744 | a | a | a | 188,718 | 1,673,774 | 11,880,826 | 15,567,368 |
| Wire, and wire rope and strand, iron or steel..... | 589,732 | a | a | a | 30,334 | a | a | a |
| Anvils, axes and forgings, of iron or steel..... | 286,185 | a | a | a | 15,018 | a | a | a |
| Chains, of iron or steel..... | 175,235 | a | a | a | 8,678 | a | a | a |
| Files, file blanks, rasps and floats..... | | | | | 1,828 | a | a | a |
| Needles..... | | | | | 28,381 | a | a | a |
| All other..... | | | | | 188,170 | a | a | a |
| Tin, bars, blocks, or pigs, grain or granulated..... | 2,688,646 | 2,373,952 | 21,413,118 | 14,831,952 | 592,490 | 548,640 | 4,692,356 | 3,712,276 |
| Zinc, spelter, or Tutenague, and manufactures of..... | | | | | 10,992 | 78,193 | 273,449 | 801,262 |
| In blocks or pigs, and old..... | | | | | 1,395 | 14,741 | 65,791 | 189,517 |
| Manufactures of..... | 290,590 | 1,859,134 | 7,355,338 | 19,821,842 | | | | |

| Articles. | Domestic Exports. | | | | Values. | | | |
|---|-----------------------|-----------------------------|-----------------------|-----------------------------|-----------------------|-----------------------------|-----------------------|-----------------------------|
| | Quantities. | | Values. | | Quantities. | | Values. | |
| | Month ended Sept. 30. | Nine months ended Sept. 30. | Month ended Sept. 30. | Nine months ended Sept. 30. | Month ended Sept. 30. | Nine months ended Sept. 30. | Month ended Sept. 30. | Nine months ended Sept. 30. |
| | 1883. | 1882. | 1883. | 1882. | 1883. | 1882. | 1883. | 1882. |
| Crass, and manufactures of..... | | | | | Dollars. | Dollars. | Dollars. | Dollars. |
| Coal, bituminous..... | 84,480 | 63,145 | 486,927 | 405,618 | 402,790 | 291,787 | 2,286,978 | 1,842,429 |
| Crass, and manufactures of..... | 64,014 | 38,080 | 428,292 | 312,191 | 221,910 | 119,898 | 1,452,550 | 1,054,788 |
| Copper, and manufactures of..... | 1,072 | 140 | 7,842 | 1,977 | 160,801 | 17,165 | 1,383,235 | 158,212 |
| Ingots, bars, and old..... | 1,949,985 | 315,718 | 13,687,791 | 2,692,533 | 300,100 | 54,140 | 2,084,108 | 519,977 |
| Lead, and manufactures of..... | 35,879 | a | a | a | 8,550 | a | a | a |
| All other..... | | | | | 15,219 | 6,044 | 85,420 | 68,742 |
| Instruments and apparatus for scientific purposes, including telegraph, telephone and other electric..... | | | | | 38,018 | 27,379 | 527,104 | 566,802 |
| Iron and steel, and manufactures of..... | | | | | | | | |
| Pig iron..... | 294 | 125 | 1,209 | 4,329 | 990 | 819 | 5,695 | 22,337 |
| Iron ore..... | 502 | 1,149 | 2,698 | 4,335 | 11,220 | 38,780 | 82,677 | 145,989 |
| Bar iron..... | 175,960 | 101,956 | 1,220,063 | 1,023,095 | 7,117 | 3,701 | 44,069 | 39,826 |
| Band, hoop and scroll iron..... | 9,110 | 16,328 | 473,490 | 267,750 | 442 | 508 | 19,784 | 11,044 |
| Car wheels..... | 2,147 | 1,338 | 14,134 | 9,156 | 18,721 | 13,022 | 144,977 | 95,233 |
| Castings, n. e. s..... | | | | | 52,548 | 275,509 | 310,808 | 810,808 |
| Cutlery..... | | | | | 7,284 | 8,835 | 65,162 | 65,162 |
| Fire-arms..... | | | | | 109,608 | 55,130 | 931,154 | 697,552 |
| Ingots, bars and rods of steel..... | 39,492 | 57,690 | 440,961 | 898,809 | 2,912 | 4,507 | 46,530 | 73,511 |
| Locks, hinges and other builders' hardware..... | | | | | 79,301 | d | d | d |
| Machinery..... | 671,058 | 452,082 | 8,435,659 | 6,179,492 | 488,751 | 553,413 | 4,344,443 | 4,284,477 |
| Nails and spikes..... | | | | | 23,496 | 17,080 | 280,839 | 247,499 |
| Plates and sheets..... | | | | | | | | |
| Of iron..... | 121,102 | b | b | b | 4,839 | b | b | b |
| Of steel..... | 1,530 | c | c | c | 168 | c | c | c |
| Printing presses and parts of..... | | | | | 18,410 | 17,888 | 302,772 | 167,057 |
| Railroad bars or rails..... | | | | | | | | |
| Of iron..... | 21 | 298 | 2,230 | 2,230 | 1,048 | 1,048 | 16,306 | 125,628 |
| Of steel..... | 25 | 5 | 1,317 | 792 | 749 | 600 | 82,143 | 72,772 |
| Saws and tools..... | | | | | 105,288 | 55,673 | 1,072,768 | 733,710 |
| Scales and balances..... | | | | | 31,077 | 29,363 | 232,101 | 245,367 |
| Sewing machines and parts of..... | | | | | 255,866 | 344,910 | 2,322,400 | 2,322,400 |
| Steam engines and parts of..... | | | | | | | | |
| Locomotive engines..... | 32 | 12 | a | a | 273,067 | 122,228 | 2,057,557 | 1,411,112 |
| Stationary engines..... | 7 | 10 | 102 | 64 | 19,020 | 127,891 | 110,121 | 110,121 |
| Boilers, and parts of..... | | | | | 29,508 | 12,454 | 194,735 | 92,578 |
| Stoves and ranges, and parts of..... | | | | | 14,967 | 21,823 | 166,302 | 140,940 |
| Wire..... | 438,301 | a | a | a | 31,763 | d | d | d |
| All other manufactures of iron and steel..... | | | | | 322,796 | 616,179 | 3,978,048 | 5,027,333 |
| Lead, and manufactures of..... | | | | | 7,077 | 45,681 | 35,017 | 35,017 |
| Plated-ware..... | | | | | 13,077 | 36,796 | 329,318 | 813,342 |
| Tin, manufactures of..... | | | | | 14,907 | 19,067 | 160,617 | 162,777 |
| Vessels sold to foreigners..... | | | | | | | | |
| Steamers..... | 21 | 160 | 300 | 4,000 | 4,000 | 35,850 | 55,063 | 55,063 |
| Sailing vessels..... | | | | | | 100,064 | 34,700 | 34,700 |
| Zinc, and manufactures of..... | | | | | | | | |
| Ore or oxide..... | 16 | 22 | 61 | 108 | 1,488 | 329 | 5,594 | 7,456 |
| Pigs, bars, plates and sheets..... | 4,111 | 350,983 | 102,909 | 1,121,539 | 258 | 30,461 | 6,949 | 95,181 |
| All other manufactures of..... | | | | | 1,135 | d | d | d |

| Articles. | Exports of Foreign Merchandise. | | | | Values. | | | |
|--|---------------------------------|-----------------------------|-----------------------|-----------------------------|-----------------------|-----------------------------|-----------------------|-----------------------------|
| | Quantities. | | Values. | | Quantities. | | Values. | |
| | Month ended Sept. 30. | Nine months ended Sept. 30. | Month ended Sept. 30. | Nine months ended Sept. 30. | Month ended Sept. 30. | Nine months ended Sept. 30. | Month ended Sept. 30. | Nine months ended Sept. 30. |
| | 1883. | 1882. | 1883. | 1882. | 1883. | 1882. | 1883. | 1882. |
| Crass, and manufactures of..... | | | | | Dollars. | Dollars. | Dollars. | Dollars. |
| Coal, bituminous..... | 51 | 56 | 543 | | 74 | 463 | 2,287 | |
| Copper, and manufactures of..... | | | | | 530 | 557 | 4,087 | |
| Ore (fine copper contained therein)..... | 66,733 | a | a | a | 7,879 | 50,808 | 32,518 | |
| Pigs, bars, ingots, old, and other unmanufactured..... | 21,835 | | 27,395 | 2,312 | 2,000 | 2,700 | 204 | |
| All other manufactures of..... | | | | | 2,674 | 018 | 14,018 | |
| Iron and steel, and manufactures of..... | | | | | | | | |
| Pig iron..... | 55 | 147 | 545 | 1,377 | 937 | 2,305 | 8,436 | 24,590 |
| Scrap, fit only to be remanufactured..... | | | | | | | | |
| Iron, wrought and cast..... | 82,719 | 144,484 | 736,692 | 702,154 | 1,564 | 2,399 | 12,501 | 12,924 |
| Bar iron, rolled or hammered..... | | | | | | | | |
| Bars, railway..... | | | | | | | | |
| Of iron..... | 50 | 93 | 1,394 | 29,317 | 1,394 | 29,317 | 29,317 | 29,317 |
| Of steel, or in part of steel..... | 5,213 | 20,261 | 20,261 | 18,721 | 155,464 | 562,692 | 627,317 | 627,317 |
| Hoop, band and scroll iron..... | 2,000 | 40,370 | 8,000 | 51 | 51 | 810 | 141 | 141 |
| Sheet, plate and taggers' iron..... | 12,907 | 800,720 | 55,101 | 5,169 | 591 | 6,571 | 3,339 | 3,339 |
| Tin plates, terne plates, or taggers' tin..... | 180,536 | 29,232 | 1,579,273 | 2,440,144 | 1,370 | 59,739 | 90,818 | 90,818 |
| Cutlery..... | | | | | 80 | 780 | 1,302 | 7,271 |
| Fire-arms..... | | | | | 1,047 | 690 | 2,391 | 2,391 |
| Machinery..... | | | | | 3,036 | 6,190 | 55,321 | 62,589 |
| Ingots, blooms, slabs, billets and bars of steel, and steel in forms, n. e. s..... | | | | | | | | |
| Wire and wire-rope and strand, iron or steel..... | 16,446 | a | a | a | 68 | a | a | a |
| Anvils, axes and forgings, of iron or steel..... | 4,394 | a | a | a | 471 | a | a | a |
| Chains, of iron or steel..... | 5,170 | a | a | a | 142 | a | a | a |
| Needles..... | | | | | 28 | a | a | a |
| All other..... | | | | | 18,765 | a | a | a |
| Lead, and manufactures of..... | | | | | | | | |
| Metals, metal compositions, and manufactures of, n. e. s..... | | | | | 1,193 | 4,530 | 19,309 | |
| Bronze manufactures..... | | | | | 2,877 | 2,590 | 25,666 | 19,337 |
| All other..... | | | | | 25 | | 19,038 | 58,170 |
| Tin, bars, blocks or pigs, grain or granulated..... | | | 87,130 | 257,390 | | | | 572 |
| Zinc, spelter, &c..... | | | | | | | | |

a.—Not stated. b.—Included in "band, hoop and scroll iron."

c.—Included in "ingots, bars and rods of steel." d.—Included in "all other manufactures."

German Armor Plating.—A number of German and foreign officers have been invited to Buckau, near Magdeburg, to witness a series of interesting experiments with German artillery against German armor-plating. The gun employed is one of Krupp's heaviest calibers, the tube being more than 25 feet in length and weighing over 50 tons, while the bore is 30½ cm. The shot used in the experiments stands over a yard high and weighs half a ton. It is solid and conical, tapering to a very sharp point, the material consisting of Krupp's hardened steel. The charge of powder weighs 2½ cwt. The plates employed in the construction of the turret are of chilled iron, 1 m. in thickness, and of a hardness equal to that of the finest and hardest steel.

Saxon Antiquities.—The recent examination of a tumulus situated in the old churchyard of Taplow, England, has resulted in the discovery of a remarkable series of

Anglo-Saxon objects. The articles include an elegant jeweled and enameled gold buckle, gold fibula, silver armlets and wrist ornaments, a bronze shield, breastplate and helmet, iron sword, spear, bronze bucket, two drinking horns, with ornamental metal mountings, two glass vessels remarkably characteristic of the early Anglo-Saxon glass manufacture, and other interesting items. Portions of human remains, showing no signs of cremation, were found with the articles at a depth of about 8 feet below the natural level of the floor of the barrow, which must have been the grave of a person of considerable distinction.

A London company has patented a device for lighting railway coaches by means of a battery carried beneath them. It is said that the chemicals used will cost only one-eighth as much as the appliances hitherto used to develop the same electrical energy. On a trial trip a Pullman dining-car on the

Northern road was lighted brilliantly by six Swan incandescent lamps, the supply being furnished by a battery of 12 cells, the length of the battery being 4 feet, and the breadth and depth each 8 inches. The excellence and steadiness of the light were highly commended; it was perfectly easy to read small type while the car was at full speed. After other preliminary trials, several railway companies have made propositions for the adoption of the system. The inventors say that they can supply private dwellings at less cost than the estimates lately published by the Edison or Goulicher companies. A battery capable of supplying 15 lights for 18 hours continuously, it is stated, would weigh 300 pounds.

Morton & Co., iron merchants, of Glasgow, and the Greenock Iron Company, have suspended, owing to the failure of Dobie & Co., shipbuilders, of Govan. The liabilities of both are heavy.

INDUSTRIAL ITEMS.

NEW HAMPSHIRE.

The Nashua Co-operative Foundry Company have recently purchased the tools, together with the land and buildings now occupied by them and formerly known as the Otterson Foundry.

MASSACHUSETTS.

The new Groveland iron foundry, at Dighton, is nearing completion, and the machinery will soon be in position.

| | Bid. | Asked. |
|-------------------|-------|--------|
| nie..... | 11 | 12 |
| ice..... | 2.50 | ... |
| ta Mont..... | 3 | 5 |
| H. & E., new..... | 3 1/4 | 1.00 |

The situation of Barb Wire remains practically the same as that described last week. Prices are firmly maintained, and manufacturers regard the future with confidence. We continue to quote 7½ cents per pound for ordinary lots and 6 cents per pound for large quantities.

Allegheny Mountains, who have industriously improved the time of the stoppage of the Western mills by throwing their surplus product into the West in competition with the Western manufacturers. I am at a loss, however, to know why the Eastern manufacturers should not heartily co-operate with the Western manufacturers in all measures pertaining to the general interest of the Nail trade, especially nowadays, when the railroad facilities of the country disregard the Allegheny Mountains, recognized as the dividing line between the Atlantic and the

Western Nail Association's fields of operation. If the manufacturers composing the Atlantic Association act wisely in the future by co-operating with the Western Association, they will do well; otherwise the road to bankruptcy or forced stoppage of their machines is a very short one.

"The future of the Nail trade depends, in my judgment, more upon the universal co-operation of all the Nail manufacturers in the East and West in their joint adherence to the enforcement of the policy of restricted production than upon the increased or decreased productive machinery, for the good reason that new machinery will be built as long as there are men found who think other branches of the Iron business are better than the one in which they are engaged.

"It is stated by the Secretary of the American Iron and Steel Association that in August, 1882, there were 68 Nail factories, which contained 4167 machines, having an estimated capacity, full running time, of 9,500,000 kegs per annum, while the actual product per annum never exceeded 6,147,097 kegs, or about two-thirds of the productive capacity. We are also informed by the same authority that there are now 74 Nail factories containing 5008 machines, with an annual capacity, full 12 months' running time, of 11,376,000 kegs. Many of the machines said to be now under construction will in all probability never be built, while others enumerated in the list to be put in operation by January 1, 1884, cannot be put in shape to make Nails before July 1, 1884, to my personal knowledge; hence the 74 factories with 5008 machines will, in my opinion, cover all the machines that will be operated up to July 1, 1884, especially so when 256 of the 5008 given have been for years, and are now, like many of our old army officers, on the retired list. It is, therefore, safe to estimate the product of 1883, on the basis given, at not to exceed 7,500,000 kegs. Neither do I think that the product of 1883 will fall below the estimate, as the mills East and West have all run steadily from the 1st of January, 1883, to the present time, and will continue to run until the 22d of December, with the exception of a stoppage of all the machines in the West of six weeks last spring and 30 days during the summer—a very unusual run. And yet the demand has been fully equal to the supply and prices have remained reasonably satisfactory up to within the past 30 days, since which time prices have declined to \$2.65 because of the near approach of winter, the usual time of a general suspension of business in the Nail market. Judging from the present outlook, I am strongly inclined to the opinion that the exercise of the same good sense that characterized the Western Nail Association last spring, in our arrangements for the business of 1884 will give us all a reasonably prosperous year's business, though we may expect and be prepared to work on closer margins than we started on in the spring of 1883."

A New England Nail manufacturer writes us as follows:

"The increase of Nail machines has been much greater than the demand requires, and the outlook for any profit from manufacturing Nails is very bad. The increase of machines has been much greater in proportion in the West than in the East, and consequently there is much greater necessity of curtailing the production in the West than here. Had not the West increased its production faster in proportion than the East, we think the demand at the present time would be nearly, if not quite, equal to the production, but, as matters now are, the future prospect is very discouraging in Nail manufacturing."

The Pacific Slope contributes its share to the discussion of the situation of the Nail trade in the following letter from Mr. G. J. Walker, superintendent of the Pacific Iron and Nail Company, Oakland, Cal.:

"We deem the outlook for the Nail mills as quite serious. Combined action on the part of all the manufacturers of the United States is really necessary to the existence of the business. We do not understand why the Eastern Association is allowed to run at the expense of the Western, nor why the Western manufacturer is compelled to pay higher prices for the various labor for making Plate and cutting Nails. As the matter now stands, the Eastern manufacturer can produce Nails for much less than the Western, and also gets the benefit of a higher market. Of course, there is but one solution of the case—either the Eastern Association are possessed of more business ability and tact in managing their workmen, or their Western brethren have been 'bulldozed' so long and persistently by the labor association that they have come to accept the situation as a part of the profit and loss account. The differences paid by these two associations, in some cases but a few miles apart, would be an interesting study. There may be some glory in shining along on a small margin that will no doubt compensate the Western manufacturer partly for the curtailment of a business profit, but when the life of a business is sapped until the death struggle comes on, it would be well to look for a swift and sure remedy. I am sure that manufacturers, as a rule, are willing—yes, anxious—that their help should have a comfortable support, but not that said help should absorb the capital and leave them the experience only. The prospects of trade are gloomy. We anticipate general embarrassment and financial disaster to many, unless there be speedy and harmonious general action regarding fair and uniform rates for the same labor, and intelligent regulation of production to the wants of the country."

The following letter from a well-known Western Nail manufacturer will be read with interest, giving as it does his views both upon the delivery question and the outlook for the Nail trade:

"We concur in most of the views expressed upon this subject of deliveries, and believe that whatever system tends to make manufacturers' prices uniform to the trade is the best. If the Eastern manufacturers adopt a price at their works, or, say, at New York, it is an easy matter for the Western manufacturers to ascertain the rate of freight between New York and the lead-

ing points in the West, and adjust their prices accordingly; whereas, the Western manufacturers are so scattered, and their rates of freight so varied and changeable, that it is difficult, if not impossible, for Eastern competitors to know just what their competition is. The freight must be added to the cost of the goods, and it will be better for the buyer to add it after it is paid than for the manufacturer to add it before it has been earned or even ascertained. We think the outlook for the trade is fair. Buyers have been careful for some time and stocks are uniformly light, and the legitimate demands of the country must find their way directly to the manufacturers, with whom it now rests to hold prices steady by controlling production until the demands of the country will employ all their machinery. We think the tendency is that way."

The matter of syndicate purchases has been for some time a perplexing one to manufacturers and jobbers, and has also a special interest for smaller buyers. As discussing the subject in some of its aspects and opening a broad field, we take pleasure in laying before our readers the following communication:

To the Editor of The Iron Age: I have been engaged in the jobbing of Hardware for several years, and am now interested in a manufacturing business, recently established. I read The Iron Age, and an old neighbor keeps me posted upon local items of interest to the trade. Having noted the discussion upon the question of free deliveries provoked by "Jobber's" letter, which appeared in your columns a few weeks since, it occurred to me that the directors of our company might gain some valuable information for their guidance from the experience of older manufacturers, if such manufacturers would consent to give, through the columns of your valuable paper, their general views upon the best means for disposing of the product of a factory.

Having received a jobber's education, I, myself, may be unduly prejudiced in favor of distributing goods through the medium of wholesale houses, and so arranging schedules of prices that jobbers will be sufficiently remunerated for the distribution to insure their best efforts in making large sales. This is an old-fashioned plan, and one which I understand is gradually becoming obsolete. Under this system manufacturers formerly, either by combination or by virtue of monopoly, dictated the prices at which their products should be sold by jobbers, or, leaving the various jobbing markets to regulate themselves, supplied their customers (making factory deliveries or equalizing freight with other manufacturing points) at prices based upon quantity taken, financial responsibility and promptness of payment. Through dictating prices at which their wares should be uniformly sold, manufacturers drifted into the habit of delivering to all jobbing towns, and to this cause, I apprehend, very much of the free delivery which your correspondents so generally deprecate is chargeable. In placing the products of a new factory upon the market I am led to the query: If goods are made, for example, in New York, ought they not to sell in Chicago for a price covering the cost of transportation from this or a competing factory? Or should the prices be uniform for delivery in New York, Chicago, Omaha, Salt Lake City, San Francisco and Pekin?

Another question: If prices for jobbers' sales to the trade are established by manufacturers, should there be exceptions made governing parties who carry no stocks? Or, if jobbers' prices to their customers are not dictated by the manufacturers, should large and small jobbers and retailers be supplied at the same prices? I am led to ask these questions, which might ordinarily seem childish, on information as to the latter-day practices of some manufacturers, and particularly am I led to ask them at this time by the letter in your issue of November 22, signed by "Eastern Merchant," and from which I quote: "The selling of goods to irresponsible resident buyers who combine the purchases of small houses will lead to more serious loss to manufacturers than any freight deliveries." I learn that certain manufacturers (and this includes some who claim to have their established prices to retailers maintained) sell these so-called "irresponsible resident buyers" at the lowest rate to jobbers, and in exceptional cases, where bids are asked upon round lots of goods, at lower than jobbers' rates, and these goods are distributed among small jobbers and retailers at the purchase price from the manufacturer, the middle man receiving a yearly salary for his services. I am told, for example, that the oldest and largest manufacturer of Shovels in New England, who aims to control the price of his goods after they have passed into the hands of jobbers, has been in the habit of selling at his lowest rate to one of the syndicate buyers for distribution in lots of five dozen and upward to the small trade throughout the country, and that men who are known as retailers have made for themselves a local reputation for shrewd buying by wholesaling to merchants in neighboring towns at less than the prices established by the manufacturer.

These sales were made to the syndicate notwithstanding the fact that the buyer's printed contract with his patrons contained a clause binding him to turn over all his purchases without any commission to himself—a fact that the New England manufacturer should certainly have been acquainted with before making his broadcast sales at quantity prices. The retail dealers were not restricted, while the legitimate jobbers were compelled by the edict of the manufacturer to hold to the fixed prices. I learn that, as a result, prices were demoralized and the large jobbers, to a man, are working to introduce and sell goods which are not branded with the New England manufacturer's name. I also understand that a well-known brand of Wrenches has passed through the same experience as the standard Shovel referred to, and with the same result. I am told that one of the syndicate buyers has placed an order with a leading manufacturer for his patron's stocks of Green Wire Cloth, the goods to be delivered during 1884, at \$1.05 per 100 feet. My informant says this is very cheap, and that this and many other lines of goods are being depressed in price by the efforts of jobbers to sell in competition with manufac-

turers who are supplying the small trade at extremely low prices through the channel of syndicate sales. He instances the price of Strap Hinges for the year 1883, and says there are only four or five makers of these goods, with no overproduction, and yet the prices ruling have been ridiculously low during the entire season, claiming it to be the result of spring bids to a syndicate buyer for a round lot of Hinges to be distributed in barrel shipments and upward.

On the other hand, it is said that the leading Saw, File, Lock and some manufacturers of other lines, believing such policy an injurious one, and fearing demoralization of prices, will not sell their goods except directly to the legitimate jobbers and at prices to which each is individually entitled. The question which I wish solved, without experiment upon the part of my people, is, which is the surest method of building up a permanent business upon a meritorious line of goods—the old-fashioned one first mentioned, or the new-fashioned one of selling to jobbers what they can be induced to purchase, and bidding upon the requisitions of syndicate buyers at prices that will be sure to "take the cake." It occurs to me that if we decide to adopt the latter plan it might be as well to issue but one price list, and that one applicable to the smallest retailer as well as to the largest jobber, as the prices will necessarily soon reach the lowest possible limit and will be alike to all purchasers. I, like many of my fellow manufacturers, would be glad to sell to the jobber, supply his customers and fill the wants of the consumers, but how to do it and foster all branches of the trade, and at the same time not reduce the prices below those that will afford a living profit for ourselves, is the information I solicit from the experienced manufacturers. Will they favor?

Yours truly,
JONATHAN DUDLEY.

The following letter from a retail Hardware merchant brings up a subject of general interest. Purchasers of Hardware and other merchandise are not infrequently subjected to unreasonable charges for packages and cartage. Whether or not charges are made for these items in the invoice, the matter should certainly be understood by buyer and seller at the time the goods are ordered:

To the Editor of The Iron Age: Knowing that your valuable paper is the mouthpiece of the Hardware trade, from the largest manufacturers or importers to the smallest retailer, I was much interested in the communications in your recent issues in regard to delivering merchandise. The reading of this discussion brought to our mind a grievance which we, as retailers, have to bear, and which we think should be corrected. We allude to what some jobbers and manufacturers are pleased to style "P. & C.," tacked at the end of each invoice, and ranging in expense to us from 25 cents to \$5. We suppose it means package and cartage, but it sounds to us something like "Peanuts and Cigars," or, transposed, it gives "Catch Penny," and that is just what it amounts to. The jobber will say, "Our packages cost us a great deal of money, and we must charge our customers for them." Well, we suppose their stationery must cost them considerable; why not charge us for the paper the invoice is made out on? The item of postage also must be quite large; why not add another item at the end of the invoice and call it "P. & S."—postage and stationery. In other words, if we are to be called upon to pay any of the expense of packing and shipping goods, why not all? If not all, why any part of it? In the matter of drayage there seems to be no regularity or consistency. Sometimes it is 50 cents for 50 pounds, and sometimes 15 cents for 1/2 ton. But why any cartage at all? The jobber does not relinquish possession of and is responsible for the goods until delivered to the proper forwarding companies, from whom he obtains a receipt, which he sends to the consignee, when he is very particular to inform them that his responsibility ceases. If the jobber can charge for cartage, why not for the expense of running his elevator that transports the goods from his upper floors, or the expense of loading them on the trucks? We cannot see why they could not as consistently make such charges. But perhaps, like the drummer's overcoat, "It's there, shush the same." We have often thought so. If retailers would refuse to pay these "catch-penny" charges and buy only of those jobbers and manufacturers who deliver their goods f.o.b., the silly custom could soon be broken up.

HARDWARE.

The following communication has been received in reply to the letter of "Retailer," which appeared two weeks ago.

To the Editor of The Iron Age: We notice in your issue of November 22 a letter signed "Retailer," complaining that manufacturers do not furnish Screws with their Mortise Door Locks. In this connection we beg to call attention to the fact, that it has been the practice of this company for years to pack with all of its Rim and Mortise Door Locks complete fittings, including Screws, so that the Locks, as received by the customer in the paper box, contain everything that is necessary for their putting on.

Respectfully,
THE YALE & TOWNE MANUFACTURING CO.

The association of Lock manufacturers met on Tuesday, and as we go to press are still in session. Among other matters which are under consideration is the question of the advisability of revising the present list prices for Door Locks.

The situation in the Glass market remains unaltered, the strike at Pittsburgh continuing, though it is apparently becoming a hopeless one for the workmen. It is said that there are 30 carloads of Glass at Pittsburgh, to be divided among the members of the syndicate. Since the inauguration of strike, it is stated that 100,000 boxes of Glass have been imported to Pittsburgh. In case the present condition of things continues, a much larger quantity will be introduced. The blowers and manufacturers both view this fact with favor, the blowers asserting that the manufacturers cannot afford to

see the importation increase while their furnaces are cold, and the employers insisting that the large importations must prove to the strikers their assertion that it is better to import than produce at the present cost of production. The demand in this market has fallen off considerably, and there is not the same animation and spirit in it. Prices are accordingly shaded a little, and we now make the quotation discount 60 and 15 per cent. to discount 60 and 20 per cent. in special cases.

A meeting has been held by the Cartridge manufacturers with a view to strengthen the prices and further carry into effect the agreements which were made last September. The result is that the Cartridge market is strong at the late advance, and arrangements are made to secure entire uniformity in prices among the different manufacturers. No change was made in discounts, the quotation remaining as before, at discount 65 and 5 per cent. on Rim Fire Cartridges, and discount 45 per cent. on Central Fire Cartridges.

We take this opportunity of directing the attention of manufacturers to the "Special Notice" which will be found on another page, in which a house in Europe proposes for agencies of American Hardware. With the copy for this advertisement came references to well-known houses here, by whom we are assured that the advertisers are a responsible house, with whom manufacturers may treat with confidence. They desire, it will be observed, arrangements for the sale of all sorts of American Saws, Agricultural Implements, Pitchforks, Rakes, Shovels, Spades, Hatchets and Axes, Mechanics' Tools, both for wood and metal working; Castings, Furniture Casters, Screw Pulleys, Lamps, Window Shade Rollers and appurtenances, Kitchen Utensils, Enameled Hollow-ware, machines for family use and kitchens, and Leather Belting. It will be worth the while of manufacturers to consider the matter.

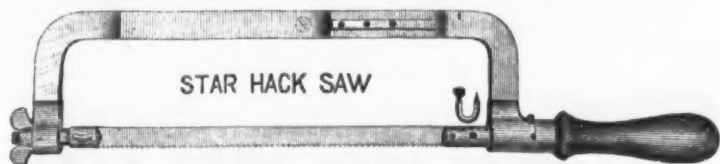
The demand for Tin Plates has fallen off materially, and the market is getting dull. We reduce our quotations on Coke Tin Plates, as prices are perceptibly lower. Charcoal Tin Plates remain unaltered. There is no special accumulation of stocks here, but shipments from the other side are being curtailed.

Our quotations on English Steel will show the changes in prices which have taken place. The competition between the English and American makers is very animated, and lower figures for English Steel are made on Circular Saw Plates, Round Machinery, Swaged and German Steel.

The American Screw Company, Providence, R. I., under date of December 1, have reduced the price on Rivets and Burrs from 40 per cent. discount to 45 per cent. discount. They have also adopted the following price list on Wire Nails and Escutcheon Pins, a line of goods which they are now making, on which they quote 25 per cent. discount:

STEEL AND IRON WIRE NAILS.—PRICE PER POUND.

| Wire gauge. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | Wire gauge. |
|--------------------|-------------------|--------------------|-------------------|--------------------|-------------------|--------------------|-------------------|--------------------|-------------------|---------------------|-------------------|---------------------|-------------------|---------------------|-------|----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|-------------|
| $\frac{1}{16}$ in. | $\frac{1}{8}$ in. | $\frac{3}{16}$ in. | $\frac{1}{4}$ in. | $\frac{5}{16}$ in. | $\frac{3}{8}$ in. | $\frac{7}{16}$ in. | $\frac{1}{2}$ in. | $\frac{9}{16}$ in. | $\frac{5}{8}$ in. | $\frac{11}{16}$ in. | $\frac{3}{4}$ in. | $\frac{13}{16}$ in. | $\frac{7}{8}$ in. | $\frac{15}{16}$ in. | 1 in. | 1 $\frac{1}{16}$ in. | 1 $\frac{1}{8}$ in. | 1 $\frac{1}{4}$ in. | 1 $\frac{3}{8}$ in. | 1 $\frac{1}{2}$ in. | 1 $\frac{5}{8}$ in. | 1 $\frac{3}{4}$ in. | 1 $\frac{7}{8}$ in. | 2 in. |
| 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | 42 | 44 | 46 | 48 | 50 | 52 | 54 | 56 | 58 | 60 | 62 | 1/4 in. |
| 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | 42 | 44 | 46 | 48 | 50 | 52 | 54 | 56 | 58 | 60 | 62 | 64 | 1/2 in. |
| 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | 42 | 44 | 46 | 48 | 50 | 52 | 54 | 56 | 58 | 60 | 62 | 64 | 66 | 3/4 in. |
| 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | 42 | 44 | 46 | 48 | 50 | 52 | 54 | 56 | 58 | 60 | 62 | 64 | 66 | 68 | 1 in. |
| 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | 42 | 44 | 46 | 48 | 50 | 52 | 54 | 56 | 58 | 60 | 62 | 64 | 66 | 68 | 70 | 1 1/4 in. |
| 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | 42 | 44 | 46 | 48 | 50 | 52 | 54 | 56 | 58 | 60 | 62 | 64 | 66 | 68 | 70 | 72 | 1 1/2 in. |
| 28 | 30 | 32 | 34 | 36 | 38 | 40 | 42 | 44 | 46 | 48 | 50 | 52 | 54 | 56 | 58 | 60 | 62 | 64 | 66 | 68 | 70 | 72 | 74 | 1 3/4 in. |
| 30 | 32 | 34 | 36 | 38 | 40 | 42 | 44 | 46 | 48 | 50 | 52 | 54 | 56 | 58 | 60 | 62 | 64 | 66 | 68 | 70 | 72 | 74 | 76 | 2 in. |
| 32 | 34 | 36 | 38 | 40 | 42 | 44 | 46 | 48 | 50 | 52 | 54 | 56 | 58 | 60 | 62 | 64 | 66 | 68 | 70 | 72 | 74 | 76 | 78 | 2 1/4 in. |
| 34 | 36 | 38 | 40 | 42 | 44 | 46 | 48 | 50 | 52 | 54 | 56 | 58 | 60 | 62 | 64 | 66 | 68 | 70 | 72 | 74 | 76 | 78 | 80 | 2 1/2 in. |
| 36 | 38 | 40 | 42 | 44 | 46 | 48 | 50 | 52 | 54 | 56 | 58 | 60 | 62 | 64 | 66 | 68 | 70 | 72 | 74 | 76 | 78 | 80 | 82 | 2 3/4 in. |
| 38 | 40 | 42 | 44 | 46 | 48 | 50 | 52 | 54 | 56 | 58 | 60 | 62 | 64 | 66 | 68 | 70 | 72 | 74 | 76 | 78 | 80 | 82 | 84 | 3 in. |
| 40 | 42 | 44 | 46 | 48 | 50 | 52 | 54 | 56 | 58 | 60 | 62 | 64 | 66 | 68 | 70 | 72 | 74 | 76 | 78 | 80 | 82 | 84 | 86 | 3 1/4 in. |
| 42 | 44 | 46 | 48 | 50 | 52 | 54 | 56 | 58 | 60 | 62 | 64 | 66 | 68 | 70 | 72 | 74 | 76 | 78 | 80 | 82 | 84 | 86 | 88 | 3 1/2 in. |
| 44 | 46 | 48 | 50 | 52 | 54 | 56 | 58 | 60 | 62 | 64 | 66 | 68 | 70 | 72 | 74 | 76 | 78 | 80 | 82 | 84 | 86 | 88 | 90 | 3 3/4 in. |
| 46 | 48 | 50 | 52 | 54 | 56 | 58 | 60 | 62 | 64 | 66 | 68 | 70 | 72 | 74 | 76 | 78 | 80 | 82 | 84 | 86 | 88 | 90 | 92 | 4 in. |
| 48 | 50 | 52 | 54 | 56 | 58 | 60 | 62 | 64 | 66 | 68 | 70 | 72 | 74 | 76 | 78 | 80 | 82 | 84 | 86 | 88 | 90 | 92 | 94 | 4 1/4 in. |
| 50 | 52 | 54 | 56 | 58 | 60 | 62 | 64 | 66 | 68 | 70 | 72 | 74 | 76 | 78 | 80 | 82 | 84 | 86 | 88 | 90 | 92 | 94 | 96 | 4 1/2 in. |
| 52 | 54 | 56 | 58 | 60 | 62 | 64 | 66 | 68 | 70 | 72 | 74 | 76 | 78 | 80 | 82 | 84 | 86 | 88 | 90 | 92 | 94 | 96 | 98 | 4 3/4 in. |
| 54 | 56 | 58 | 60 | 62 | 64 | 66 | 68 | 70 | 72 | 74 | 76 | 78 | 80 | 82 | 84 | 86 | 88 | 90 | 92 | 94 | 96 | 98 | 100 | 5 in. |
| 56 | 58 | 60 | 62 | 64 | 66 | 68 | 70 | 72 | 74 | 76 | 78 | 80 | 82 | 84 | 86 | 88 | 90 | 92 | 94 | 96 | 98 | 100 | 102 | 5 1/4 in. |
| 58 | 60 | 62 | 64 | 66 | 68 | 70 | 72 | 74 | 76 | 78 | 80 | 82 | 84 | 86 | 88 | 90 | 92 | 94 | 96 | 98 | 100 | 102 | 104 | 5 1/2 in. |
| 60 | 62 | 64 | 66 | 68 | 70 | 72 | 74 | 76 | 78 | 80 | 82 | 84 | 86 | 88 | 90 | 92 | 94 | 96 | 98 | 100 | 102 | 104 | 106 | 5 3/4 in. |
| 62 | 64 | 66 | 68 | 70 | 72 | 74 | 76 | 78 | 80 | 82 | 84 | 86 | 88 | 90 | 92 | 94 | 96 | 98 | 100 | 102 | 104 | 106 | 108 | 6 in. |
| 64 | 66 | 68 | 70 | 72 | 74 | 76 | 78 | 80 | 82 | 84 | 86 | 88 | 90 | 92 | 94 | 96 | 98 | 100 | 102 | 104 | 106 | 108 | 110 | 6 1/4 in. |
| 66 | 68 | 70 | 72 | 74 | 76 | 78 | 80 | 82 | 84 | 86 | 88 | 90 | 92 | 94 | 96 | 98 | 100 | 102 | 104 | 106 | 108 | 110 | 112 | 6 1/2 in. |
| 68 | 70 | 72 | 74 | 76 | 78 | 80 | 82 | 84 | 86 | 88 | 90 | 92 | 94 | 96 | 98 | 100 | 102 | 104 | 106 | 108 | 110 | 112 | 114 | 6 3/4 in. |
| 70 | 72 | 74 | 76 | 78 | 80 | 82 | 84 | 86 | 88 | 90 | 92 | 94 | 96 | 98 | 100 | 102 | 104 | 106 | 108 | 110 | 112 | 114 | 116 | 7 in. |
| 72 | 74 | 76 | 78 | 80 | 82 | 84 | 86 | 88 | 90 | 92 | 94 | 96 | 98 | 100 | 102 | 104 | 106 | 108 | 110 | 112 | 114 | 116 | 118 | 7 1/4 in. |
| 74 | 76 | 78 | 80 | 82 | 84 | 86 | 88 | 90 | 92 | 94 | 96 | 98 | 100 | 102 | 104 | 106 | 108 | 110 | 112 | 114 | 116 | 118 | 120 | 7 1/2 in. |
| 76 | 78 | 80 | 82 | 84 | 86 | 88 | 90 | 92 | 94 | 96 | 98 | 100 | 102 | 104 | 106 | 108 | 110 | 112 | 114 | 116 | 118 | 120 | 122 | 7 3/4 in. |
| 78 | 80 | 82 | 84 | 86 | 88 | 90 | 92 | 94 | 96 | 98 | 100 | 102 | 104 | 106 | 108 | 110 | 112 | 114 | 116 | 118 | 120 | 122 | 124 | 8 in. |
| 80 | 82 | 84 | 86 | 88 | 90 | 92 | 94 | 96 | 98 | 100 | 102 | 104 | 106 | 108 | 110 | 112 | 114 | 116 | 118 | 120 | 122 | 124 | 126 | 8 1/4 in. |
| 82 | 84 | 86 | 88 | 90 | 92 | 94 | 96 | 98 | 100 | 102 | 104 | 106 | 108 | 110 | 112 | 114 | 116 | 118 | 120 | 122 | 124 | 126 | 128 | 8 1/2 in. |
| 84 | 86 | 88 | 90 | 92 | 94 | 96 | 98 | 100 | 102 | 104 | 106 | 108 | 110 | 112 | 114 | 116 | 118 | 120 | 122 | 124 | 126 | 128 | 130 | 8 3/4 in. |
| 86 | 88 | 90 | 92 | 94 | 96 | 98 | 100 | 102 | 104 | 106 | 108 | 110 | 112 | 114 | 116 | 118 | 120 | 122 | 124 | 126 | 128 | 130 | 132 | 9 in. |
| 88 | 90 | 92 | 94 | 96 | 98 | 100 | 102 | 104 | 106 | 108 | 110 | 112 | 114 | 116 | 118 | 120 | 122 | 124 | 126 | 128 | 130 | 132 | 134 | 9 1/4 in. |
| 90 | 92 | 94 | 96 | 98 | 100 | 102 | 104 | 106 | 108 | 110 | 112 | 114 | 116 | 118 | 120 | 122 | 124 | 126 | 128 | 130 | 132 | 134 | 136 | 9 1/2 in. |
| 92 | 94 | 96 | 98 | 100 | 102 | 104 | 106 | 108 | 110 | 112 | 114 | 116 | 118 | 120 | 122 | 124 | 126 | 128 | 130 | 132 | 134 | 136 | 138 | 9 3/4 in. |
| 94 | 96 | 98 | 100 | 102 | 104 | 106 | 108 | 110 | 112 | 114 | 116 | 118 | 120 | 122 | 124 | 126 | 128 | 130 | 132 | 134 | 136 | 138 | 140 | 10 in. |
| 96 | 98 | 100 | 102 | 104 | 106 | 108 | 110 | 112 | 114 | 116 | 118 | 120 | 122 | 124 | 126 | 128 | 130 | 132 | 134 | 136 | 138 | 140 | 142 | 10 1/4 in. |
| 98 | 100 | 102 | 104 | 106 | 108 | 110 | 112 | 114 | 116 | 118 | 120 | 122 | 124 | 126 | 128 | 130 | 132 | 134 | 136 | 138 | 140 | 142 | 144 | 10 1/2 in. |
| 100 | 102 | 104 | 106 | 108 | 110 | 112 | 114 | 116 | 118 | 120 | 122 | 124 | 126 | 128 | 130 | 132 | 134 | 136 | 138 | 140 | 142 | 144 | 146 | 10 3/4 in. |
| 102 | 104 | 106 | 108 | 110 | 112 | 114 | 116 | 118 | 120 | 122 | 124 | 126 | 128 | 130 | 132 | 134 | 136 | 138 | 140 | 142 | 144 | 146 | 148 | 11 in. |
| 104 | 106 | 108 | 110 | 112 | 114 | 116 | 118 | 120 | 122 | 124 | 126 | 128 | 130 | 132 | 134 | 136 | 138 | 140 | 142 | 144 | 146 | 148 | 150 | 11 1/4 in. |
| 106 | 108 | 110 | 112 | 114 | 116 | 118 | 120 | 122 | 124 | 126 | 128 | 130 | 132 | 134 | 136 | 138 | 140 | 142 | 144 | 146 | 148 | 150 | 152 | 11 1/2 in. |
| 108 | 110 | 112 | 114 | 116 | 118 | 120 | 122 | 124 | 126 | 128 | 130 | 132 | 134 | 136 | 138 | 140 | 142 | 144 | 146 | 148 | 150 | 152 | 154 | 11 3/4 in. |
| 110 | 112 | 114 | 116 | 118 | 120 | 122 | 124 | 126 | 128 | 130 | 132 | 134 | 136 | 138 | 140 | 142 | 144 | 146 | 148 | 150 | 152 | 154 | 156 | 12 in. |



STAR HACK SAW PRICE LIST.

PRICE OF BLADES.

| | | | | |
|-----------------------------|---------|---------|---------|-----------|
| Length of Blade..... | 6 inch. | 7 inch. | 8 inch. | 9 inch. |
| Price per Dozen Blades..... | 55 | 60 | 65 | 70 cents. |

PRICE OF STEEL FRAMES PER DOZEN.

| | |
|---|--------|
| No. 1 Extension Frame, Polished and Nickel Plated, per Dozen..... | \$9.60 |
| " 2 Solid | 8.40 |

These frames are all made of steel, and, as seen in the cut, are all adjustable so as to face the blade in four different directions. The extension frames will hold the four different lengths of blades. The solid frames only hold the 8-inch blades, this being the length most in use; they all have the patent staple-shaped pins to hold the blades in the frame, which are so arranged that they cannot fall out. We say that the Star Hack Saw is 100 per cent. better than any other kind in use. If, on a fair trial, it is found that one dozen of our Saws will not cut as much as two dozen of any other kind, we hereby authorize all dealers to return what they may have in stock, at our expense. Now, if our competitors have the same faith in their saws, let them make the same offer, so that Dealers may unload what they don't want, and sell only the best, whichever one it proves to be.

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Forged Horse Nails.

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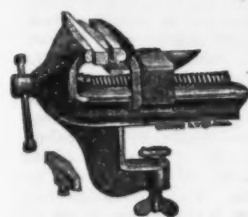
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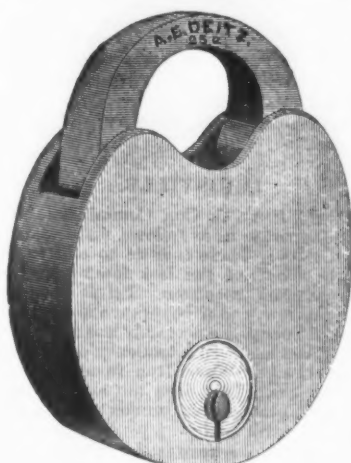


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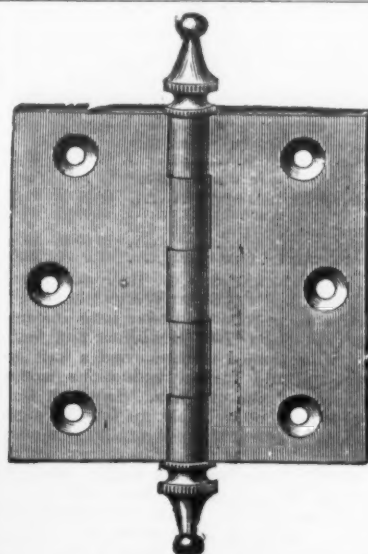
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Fine Machinists' Tools,

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Genuine and Mechanics

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Screw Wrenches

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ESTABLISHED IN 1839.



Our Genuine Wrenches are made with
straight bars, full width and enlarged jaw, hav-
ing ribs cast inside, which strengthen the jaw
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ferrule, made with double bearings, an iron
tube, fitted to the shank and resting against
the lower bearings, rigidly held in position by
the handle and nut, effectually preventing back
thrust of ferrule (see sectional view), verify
our claim that we manufacture the heaviest
and strongest Wrench in the market. None
genuine unless stamped

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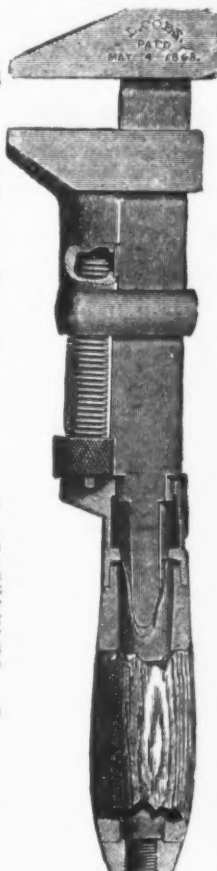
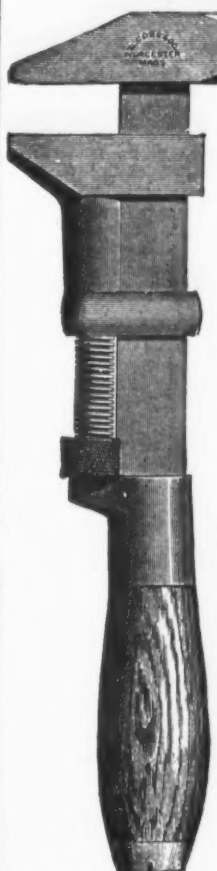
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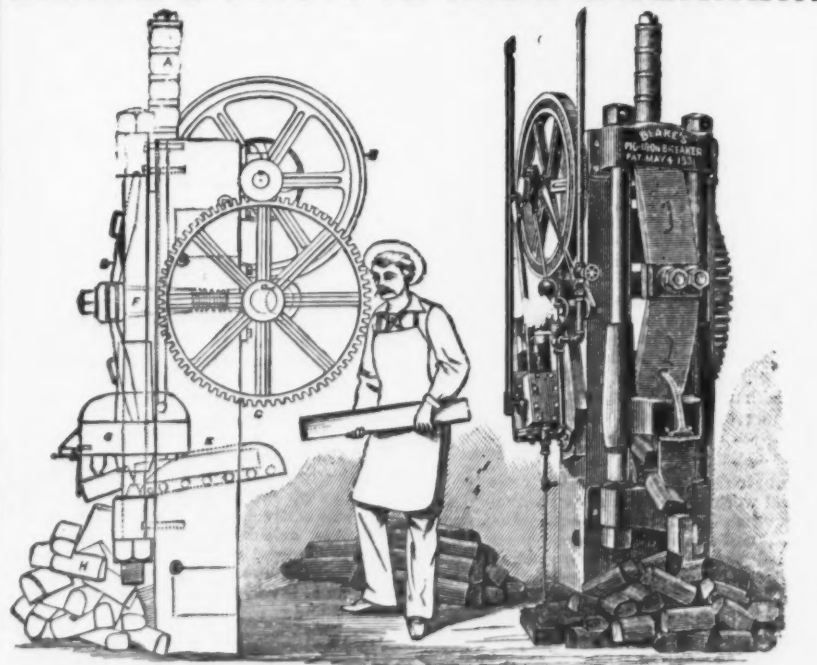
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BLAKE'S PAT. PIG IRON BREAKER.



A new and successful machine for breaking pig iron into any length desired, with rapidity and economy. Besides saving in cost of breaking by hand, it secures the greatest economy in melting. Several machines already in use. Every machine guaranteed against breakage of parts. Requires but three horse-power. Can be run by belt or have small engine attached.

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Sole Makers, 85 Orange Street NEW HAVEN, CONN.

THE ORIGINAL CONCORD AXLES.



Run Easiest, Wear Longest and Carry the Largest Load of any Axles
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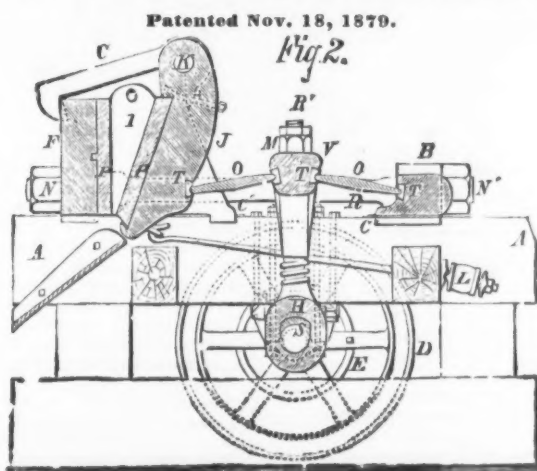
Send for Catalogue and Price List.

TRADE-MARK.



The colliers' wages question is still unsettled and does not seem to have made much progress during the week. A large number of notices is said to have been served and will shortly expire, but it would appear that the men's leaders are not yet quite sure of their ground, inasmuch as they have called another conference for the purpose of settling their final action. It is a very significant circumstance, and one which should be well weighed by the agitators, that on a poll being taken of the miners employed at the two largest pits of Newton, Chambers & Co., Thorncliffe, there was a substantial majority of votes against the proposal to serve notices for the advance. If the men really intend to proceed in this matter it would be advantageous for them to do so with as little delay as possible, the present uncertainty being no more harmful to the coal and iron trades than an open dispute on a definite issue, unless, of course, the latter should be unduly prolonged. At Glasgow the warrant market has been dull and inanimate, even though quotations have been a little better on the closing figures of last week, the coal rates being 44/6 $\frac{1}{2}$ ton. Makers' brands of Scotch pig iron are all 6d. at 1/ $\frac{1}{2}$ ton over, probably influenced by the large comparative decrease in last week's shipments. Middlesbrough there is no improvement to note; in fact, No. 3 is being offered at 37/6 3/8, and there are rumors of even the higher limit being shaded for futures. Hematite pigs are similarly quiet, and are nominal on the general basis of 46/6 at 48/ for mixed sizes in usual proportions. As was remarked last week, these pigs are now very cheap, on a sequence of which is said to be that they

THE NEW BLAKE CRUSHER OR BLAKE'S CHALLENGE ROCK BREAKER.



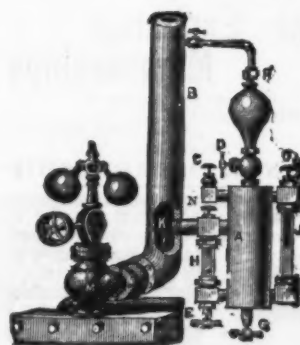
The most economical and reliable Crusher in use. Superior in all respects to our old style Blake Crushers, and rapidly superseding them and all imitations. For railway ballast, Macadam road making, and crushing of ores of all kinds it has no competitor.

This machine dispenses with cast iron frame and pitman of our old forms. All strains are on wrought iron or steel.

Awarded medals of superiority by judges of American Institute Fair, New York City, 1879 and 1880, where it was exhibited in competition with our old forms of Crusher.

BLAKE CRUSHER CO.,
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THE DETROIT LUBRICATOR COMPANY'S SIGHT FEED LUBRICATOR CUPS,



For oiling valves and cylinders of steam engines by the only perfect method, THROUGH THE STEAM PIPE. The oil passes IN SIGHT, drop by drop, into the column of steam, where it vaporizes, thus becoming a STEAM LUBRICANT, oiling perfectly every part reached by the steam. Any CLEAN OIL, black or white, light or heavy, may be used. Saves from 50 to 90 per cent. in oil and wear of machinery, thus paying for itself several times a year. A cup will be sent to responsible parties on twenty days' trial if desired. In ordering, give diameter of cylinder.

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Lubricators of every nature embodying the above features made by other parties are encroachments upon our rights, and we will hold purchasers and users, as well as manufacturers, responsible in damages for such violation.

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NOTE.—In our suit against the American Lubricator Co., of Detroit, before Justice Stanley Matthews, of the U. S. Supreme Court, involving their "Sight-feed" feature, a decree was rendered in our favor August 20, 1881.

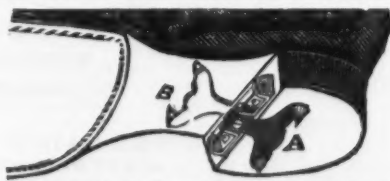
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PATENTED APRIL 30, 1878.

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This Creeper has advantages over all others.

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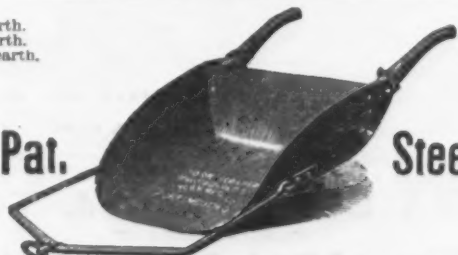
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No. 1 Carries 7 feet earth.
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No. 3 Carries 3½ feet earth.

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The York Pat. Steel Scraper



The Lightest and Strongest Scraper made. The body is made of one single piece of steel. The Handles are fastened inside of fold, and free from all obstructions. The body, ball and runners are all made of steel. Especially suited for contractors. Send for circulars. Manufactured by

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For the Poultryman, Gardener and Farmer, Prices from \$5.00 to \$15.00. Hardware dealers will find these mills a good selling article. Illustrated Circulars and Testimonials on application. A special discount to the trade.

WILSON BROS., Sole Manufacturers,
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Applied by ordinary workmen at one-third the cost of tin. Circulars and samples free.

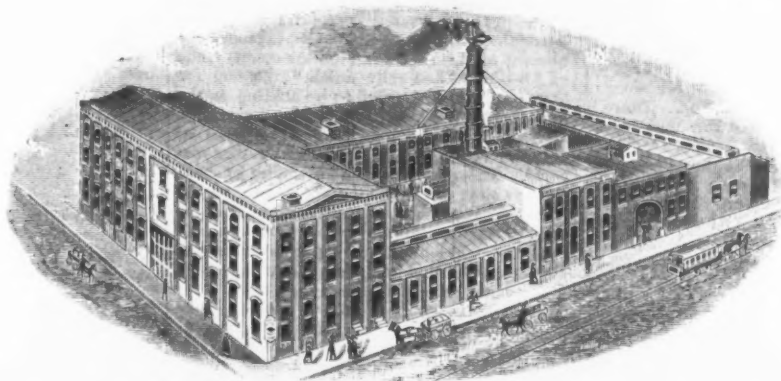
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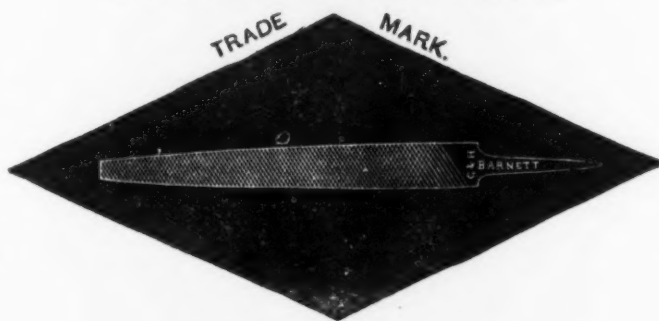
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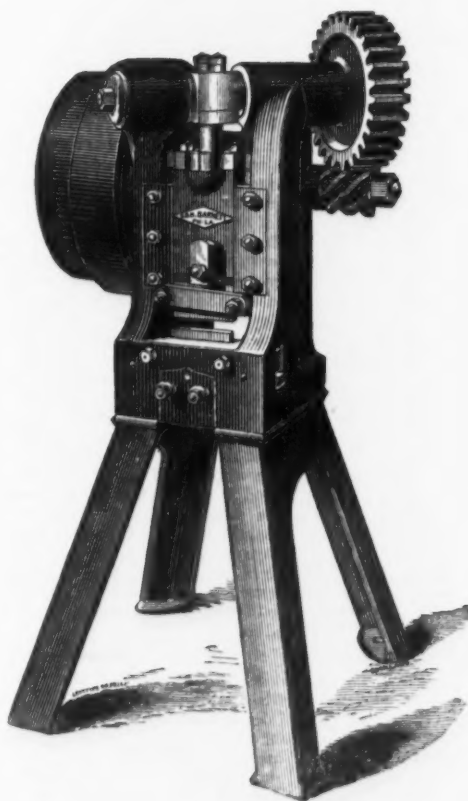


CAPACITY,
750 DOZEN
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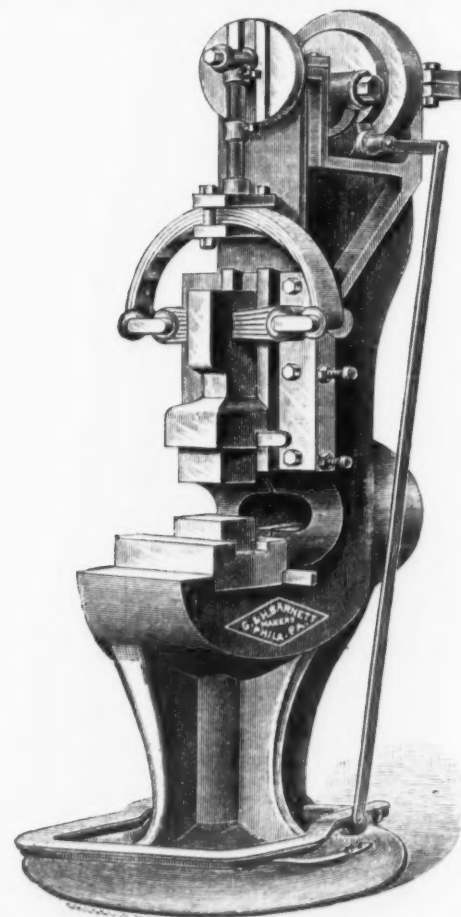
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Having had many years' experience in the use of Power Hammers, and knowing the defects and weak points of same, we can offer an article to the public which cannot be surpassed for durability and workmanship.

Our Shears for cutting up Steel to one and one-half by seven-sixteenths, Iron two and one-quarter inch by one half, cannot be beat for Speed, Strength, Durability and Neatness. The Cutters are clamped on their respective places, and can be taken out and put in readily. They have no holes in, neither have they any bolts to break, and can be used up very small, thus saving Time and Steel, and always remaining solid.

We are now prepared to manufacture above Shears, and Hammers, 15, 25 and 50 lbs., at short notice. Quotations will be given upon application to

G. & H. BARNETT,

BLACK DIAMOND FILE WORKS,

21 to 43 Richmond Street, Philadelphia, Pa., U. S. A.

are being substituted for the higher-priced all-mine brands of Staffordshire and Shropshire. All other classes of crude iron are nominal and irregular, the uncertainty of wages being detrimental to the conclusion of forward arrangements, besides which the general outlook renders buyers more than ordinarily cautious. As regards all sorts of finished iron, we have virtually nothing new to report, a quiet demand and nominal quotations being the leading characteristics of the situation. Canadian orders are reported for strips at about £6. 2/6 and £6. 5/10, while hoops are inquired about for several export markets at about £6. 10/10. There is a moderate call for sheets for making up and galvanizing purposes at £7. 12/6, and £7. 15/ for singles, and other sorts *pro rata*. Marked bars are still £7. 10/10; medium, £6. 10/10; common, £5. 17/6 @ £6. 5/10, and ordinary Welsh, £5. 7/6. In old materials there is no change to report, save that sales of old D. H. rails are reported at equal to about 65/3 ton, f.o.b. Liverpool and Southampton, for shipment to San Francisco. Similar sorts are called 70/3 ton free at works in Staffordshire. Good No. 1 heavy wrought scrap could be bought at 53/3 ton, net cash, f.o.b. London, or other ports.

SCOTCH PIG IRON

has been very low during the week, but recovered on Friday, and closed strong at 44/4 @ 44/7 for cash, after having been down to 43/10. Under ordinary circumstances the value of warrants ought to be regarded as being so low as to justify purchases, both for speculation and investment, yet there does not appear to be any desire on the part of the public to participate in the "good thing" on hand in the warrant market. Scotch makers' brands are all rather lower, notwithstanding the stoppage of the whole of the eight furnaces at Dalmellington and a further decrease in stocks last week. There are now 101 furnaces, including 8 on hem-fires, at work in Scotland, against 114 a year ago. In Connal's stores the quantity of pig iron is 587,335 tons, as compared with 617,308 tons this date 1882. The shipments last week fell off, making the increase to date 6355 tons only, while Middleboro' pig iron imports into Scotland have increased by 24,682 tons. Writing from Glasgow November 17, James Watson & Co. said: "During the past week the Scotch iron market has fluctuated between 43/9 and 44/10 1/2, with a considerable business done in warrants. The demand for makers' iron remains quiet, and there is very little change to report in quotations. On Monday last the market here was steady between 43/9 and 43/10 1/2, cash. On Tuesday it improved from 43/10 1/2 to 44/3 1/2, and on Wednesday business was done from 44/2 1/2 to 44/6 1/2, cash. Yesterday the market was strong, with a large business from 44/4 to 44/10 1/2, cash. To-day the price receded from 44/3 to 44/4 1/2, closing with buyers at the latter figure. The shipments last week were 7574 tons, as compared with 12,199 tons for the corresponding week of last year." We quote:

| | No. 1. | No. 3. |
|----------------------------------|--------|--------|
| G. M. B., at Glasgow..... | 46/ | 44/ |
| Clyde, " " " " " " | 45/6 | 43/ |
| Coltness, " " " " " " | 45/ | 43/6 |
| Langloan, " " " " " " | 45/ | 43/6 |
| Gartsherrie, " " " " " " | 45/6 | 43/6 |
| Summerlee, " " " " " " | 45/ | 43/6 |
| Calder, " " " " " " | 45/ | 43/6 |
| Carnbroe, " " " " " " | 45/6 | 43/6 |
| Glenarnock, at Ardrossan..... | 45/6 | 43/6 |
| Eglington, " " " " " " | 45/6 | 43/6 |
| Dalmellington, " " " " " " | 45/6 | 43/6 |
| Shotts, at Leith, " " " " " " | 45/6 | 43/6 |
| Kinnell, at Bo'ness, " " " " " " | 45/6 | 43/6 |
| Carron, at Grangemouth..... | 45/6 | 43/6 |

MIDDLEBORO' PIG IRON

remains extremely unsettled and weak—features which are likely to be intensified by the cables from your side this morning, announcing a considerable reduction of the output by your ironmasters. At Middleboro' there is palpably no confidence in the near future of the local and general iron trade, and prices are nominal, even at the appended low quotations, No. 3 being 37/3 @ 37/6, and perhaps less, for the first three months of next year. G. M. B., f.o.b. at makers' wharves in the Tees, less 2 1/2 % discount for net cash, are:

the year; after that, the Deluge!

HEMATITE PIG IRONS

are quite as dull as at any time these three months past, which is saying a good deal. The demand from the Bessemer concerns is poor, but the low values of these high-class pigs are bringing numerous orders for small lots for foundry purposes. Mixed parcels are called 46/6 @ 47/6, and West Coast makers' brands are at under:

HEMATITE PIG IRONS

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| No. 1. | No. 2. | No. 3. |
|-----------------|--------|--------|
| Clontar..... | 40/ | 42/ |
| Lonsdale..... | 40/ | 42/ |
| Workington..... | 40/ | 42/ |
| Lowther..... | 40/ | 42/ |
| Distington..... | 40/ | 42/ |
| Harrington..... | 40/ | 42/ |
| Solway..... | 40/ | 42/ |
| Maryport..... | 40/ | 42/ |

North of England sorts, f.o.b. Cumberland ports, &c., are quoted:

| No. or quality. | Ordinary. | Bessemer. |
|-----------------|-----------|-----------|
| 1. " " " " " " | 40/ | 42/ |
| 2. " " " " " " | 40/ | 42/ |
| 3. " " " " " " | 40/ | 42/ |
| 4. Foundry..... | 40/ | 42/ |
| 5. " " " " " " | 40/ | 42/ |
| 6. " " " " " " | 40/ | 42/ |
| 7. " " " " " " | 40/ | 42/ |
| 8. " " " " " " | 40/ | 42/ |
| 9. " " " " " " | 40/ | 42/ |
| 10. " " " " " " | 40/ | 42/ |

The net result, therefore, is that all the agitation and worry about a uniform gauge has simply been the addition of another gauge to the score or so already in existence.

TIN PLATES

may be termed steady and moderately firm, although there are, perhaps, one or two undersellers whose efforts to bear the market are not entirely devoid of success. A good deal of buying has been noted for Australia and China—the latter taking large quantities of wasters, which the countrymen of Ah Sin "like velly much." Buyers for the States are reported to be holding back, and profess their inability to place orders at anything over 16/ for known brands of cokes, or 15/9 for the newer and less known sorts. There are said to be sellers at both these limits; consequently, the figures may be taken to represent current prices, just as 15/3 @ 15/6 stands for coke-tin wasters and 15/ for good lines of 14 x 10 wasters. For best coke tins and steel plates with coke finish the demand is steady, at 17/ @ 17/6 for I. C. There is a run on odd sizes, especially 10 x 20. Charcoals are quiet at 18/ @ 19/ for ordinary, and 20/ @ 21/ for best brands I. C. For charcoal ternes prices are 16/ for 14 x 20, and 32/ for 28 x 20 sizes. Should metals recover, all tin-plate prices would grow firmer *pro rata*.

FOREIGN.

FRANCE.

(Moniteur des Interets Materiels.)

PARIS, NOV. 18, 1888.—Metals.—Business has been looking up in this city, but dull in the department where they complain of English, Belgian and German competition; fortunately, the vintage has been abundant and puts 300,000,000 francs in circulation, which will cause a revival there. Metals have been inactive and barely steady. We quote: Copper—Chili Bars, 156.25 @ 160; Ingots and Slabs, 153.75; Best Selected, 156.75; Bars Corocoro, 162.50; Banca Tin, 322.50; Billiton, 347.50; Straits, 245.25; Australian, 246.25, and English, 245. Lead, 20.50 @ 20.50, and Spelter, 30.75 @ 40.50. Iron.—A break has occurred in this market in Merchant Iron, which has given way to 17.50 francs @ 100 kg., but as the North remains firm this decline can only be temporary. We quote Flooring Iron 17.75; Charcoal, 24; Sheets, 23 @ 25, and Wire Nails, No. 18, in bulk, 27. At the North a movement is on foot among rolling-mill owners to advance the price of Merchant Iron from 17.50 to 17.75. In the Haute-Marne the market has become quieter, but it nevertheless remains steady in view of the many orders still to be filled, which provide work for three months to come. Founders of hollow cast-iron, however, find it difficult to keep busy all of them, especially at this season of the year when the demand abates. In the Meurthe and Moselle the Longwy district, contracts have been renewed to the extent of 300,000 tons Pig Iron, which secures the blast furnaces there work for 10 months to come. The Jouff Steel Works with their new arrangements completed consume alone all that can be turned out by three blast furnaces. No. 2 Foundry is quoted at 17.50, and No. 3, at 17.25. At the Center at St. Etienne, a revival has at length also occurred. From what precedes it will be seen that the state of affairs in the iron line is quite sound and prosperous, and the future, if anything, promising. Coal is moderately active at steady prices.

BELGIUM.

(Moniteur Industriel.)

BRUSSELS, November 19, 1888.—Iron.—The week has been about as dull as can be. Rolling mills in Belgium have laid in their supplies of Pig Iron and Coal at rates forbidding their selling below the current figures, at least for the time being, unless they want to lose money. While this is the case everybody complains of the uncertain effect of local politics, which causes to depress business; nothing new in the way of adjudications turned up in the market, but the best that can be done is to take stock and prepare for the balance sheet of the year, as is usual about this time of the year. English Pig Iron does not bring over 5.70 francs the 100 kg.; Foundry is quoted 7 at Charleroi, and in Luxembourg it sells for 5.80. Puddling Pig remains steady at 5.50 for prime and 4.50 @ 5 for middling and ordinary qualities. Athus-Halanzy remains firm at 4.50. Merchant Iron has become firm at 12.50; No. 1, 13.50; No. 2 and No. 3, 14.50. Bessemer at 14.50. No. 2 Sheets command 17 francs; No. 3, 19; Commercial, 23; Thin, 25, and No. 4, 27 francs. During the first nine months the import of Steel Rails into Belgium has been only 740 tons. The export of Nails has fallen off somewhat, for it has been only 5562 tons against 7713 last year. At Charleroi makers got on slowly, from hard to mouth; they are not altogether without work, but there is no prospect of a speedy revival and all they can do is just to save themselves from losing money. Coal, though tolerably active, has become more irregular; at Liege industrial is neglected, at Mons it is, on the contrary, in demand. Domestic livelier.

GERMANY.

(Borsenhalles.)

HAMBURG, NOV. 19, 1888.—Iron.—The tendency is still decidedly downward pretty much throughout the list. Sheets resist this tendency best, and Steel is even higher, but Pig and Finished Iron is for the moment quite neglected. In Lorraine there has been a break, prices now being 20 and 25 % lower than they were in April. The improvement in Steel and its products was shown at late adjudications. Of furnaces there were in operation within the Customs' Union on Oct. 1: 73 puddling, 19 smelting, 18 Bessemer, 34 Thomas and turning out Foundry Pig. Prices are the same as given in our previous report. The Eggenforf Iron and Locomotive Company, of Hanover, has paid a 15 % dividend for the 12 months ended Oct. 31, turning out products to the value of 1,648,345 marks, against 2,487,380 the previous year. Of 99 locomotives made 44 were for export, and they have now orders for 75 more; the fresh orders on hand on Nov. 1 represented a value of 3,000,000 marks. The company employs at present 1503 men, against 214 last year. A great consolidation is going on on behalf of the Laura Works (in Prussian Silesia) with the prosperous concerns that had been founded in Poland under the auspices of the company. These have declared dividends of between 45 and 60 % of late years under cover of the high protective, or rather prohibitive, Russian duties, the main object being the production of Steel Rails in Russian Poland, an enormously profitable business. Metals have been excessively dull. Lead is lower. We quote English Pig, 14.30; ditto Sheets, 14.75; German, 12.50, and Spanish, 16.50 marks @ 50 kg. Copper is also easier, Drouthheim selling at 10.50; Lake at 7; Electrolytic, 7.7, and English, 7.0. Tin, without anything doing, may be quoted 138 @ 130, and Spelter inactive at 15.15 @ 15.50.

(Colonne Gazette.)

DUSSELDORF, NOV. 19, 1888.—Iron.—The market is generally depressed. We quote to-day, 1/2 ton: Spiegeel, prime, 61 @ 65 marks; White Pig No. 1, 24; Luxembourger Pig 37 @ 38; Charcoal, 78 @ 82; Foundry, No. 1, 70; No. 2, 65 @ 67; No. 3, 57; Spanish Mudeia, at Ruhrort, 78 @ 80; English, No. 3, there, 56; English Bessemer, at port of shipment, 40 @ 42; Spanish Mudeia, Bessemer, at Rotterdam, 28 @ 32; German Bessemer, 35 @ 36; Merchant, 120 @ 140, and Sheets, 165 @ 185. Coal and Coke active and looking up.

HOLLAND.

(Koch & Vlierboom.)

ROTTERDAM, NOV. 17, 1888.—Tin.—Our market has been irregular; a slight improvement has soon been lost again. We quote to-day: Billiton, spot, 53.25 guilders @ 50 kg.; do. distant futures, 58.75; Banca, spot, 54.50, and from impending sale, 54.50.

SPAIN.

(Revista Minera.)

MADRID, NOV., 1888.—Iron.—Ore has continued in good request at Bilbao; vessels are scarce there,

and freight rates have improved. Campanil Ore sells at 7/ @ 7/3 there; Rubio at 6/ @ 6/3, and Vena at 7/ @ 7/3.

SPANISH IMPORT AND EXPORT—FIRST EIGHT MONTHS.

| Imports. | 1882. | 1883. |
|--------------------------|---------|---------|
| Tons. | Tons. | Tons. |
| Coal..... | 791,490 | 812,334 |
| Rosin and Pitch..... | 17,006 | 15,524 |
| Crude Petroleum..... | 20,487 | 25,091 |
| Refined Petroleum..... | 254 | 638 |
| Glass and Glassware..... | 3,349 | 3,545 |
| Steel..... | 1,421 | 1,075 |
| Iron and Hardware..... | 80,137 | 70,944 |
| Tin Plates..... | 2,379 | 2,603 |
| Brass Goods..... | 581 | 674 |
| Brass Wire..... | 4,502 | 4,702 |
| Salt..... | 1,775 | 402 |
| Machinery..... | 17,332 | 15,392 |
| Total..... | 911,473 | 953,160 |

Exports.

| | | |
|---------------------|-----------|-----------|
| Total..... | 911,473 | 953,160 |
| Exports..... | | |
| | 1882. | 1883. |
| | Tons. | Tons. |
| Quicksilver..... | 1,027 | 489 |
| Ingot Copper..... | 14,253 | 15,947 |
| Iron..... | 23,554 | 33,069 |
| Lead..... | 77,470 | 83,477 |
| Zinc Ore..... | 22,339 | 25,466 |
| Copper Ore..... | 407,073 | 407,082 |
| Iron Ore..... | 2,844,923 | 3,014,034 |
| Salt..... | 157,911 | 153,773 |
| Other Minerals..... | 42,514 | 62,412 |

CHILI.

(Weber & Co.)

VALPARAISO, Oct. 1, 1888.—Copper.—Lower cable quotations brought the market down to \$17.52 1/2, which, with 4 % freight, is equal to \$16.12 1/2; sales of the fortnight 37,317 quintals. Nitrate—Has been irregular, closing at \$2.37 1/2, which is equal to 10/1, with 37/6 freight. Shipments have been unusually heavy in September, say 45,000 tons, and 49,000 tons more are loading. Sales have been considerable within the range of \$2.33 1/2 and \$2.40, at which 320,000 quintals changed hands.

SHIPMENTS—FIRST EIGHT MONTHS.

| Quintals. | 1881. | 1882. | 1883. |
|-----------------------------|-----------|-----------|-----------|
| To the North of Europe..... | 3,355,729 | 5,110,414 | 6,231,399 |
| To the Mediterranean..... | 33,136 | 74,517 | 167,305 |
| To U. S., Atlantic..... | 733,548 | 801,730 | 673,480 |
| To U. S., Pacific..... | 32,304 | 134,972 | 116,578 |
| Total..... | 4,216,807 | 6,111,638 | 7,188,553 |

Charters during the fortnight, 47,000 tons for Europe and 15,000 for the United States. Coal—Neglected to arrive; we quote Newcastle, 31/3; Oreil, 29/1, and Australian, 30/1. Exchange, 31/3 1/2.

EAST INDIES.

(Schmidt, Kustermann & Co.)

PENANG, Oct. 6, 1888.—Tin.—Receipts during the fortnight have been 9600 piculs; of these, Europeans took 8100, and Chinese 1500, with a gradual decline from \$23.30 to \$22.10, at which latter figure the market closes firm, with a stock in hand of 1200 piculs. Exchange, 4 months' bank, 3/8 1/2.

AUSTRALIA.

(Per Cable via London.)

SYDNEY, N. S. W., Nov. 8, 1888.—Hardware, irregular; most buyers stand aloof, but some firms buy largely. Galvanized Iron steady at £12. 3/8, and do. Iron Wire at £21. Scotch Pig firm at £4 for No. 1 Clyde.

The London Ivory Sales.—As of interest to the cutlery trade of this country, we note the quarterly sales of ivory in London, which commenced on October 25th and closed on the 30th. The quantity of ivory offered was 44 1/2 tons of East Indian; 25 1/2 tons of Egyptian; 20 1/2 tons of West Coast African; 2 1/2 tons of Cape of Good Hope; 6 1/2 tons of Mammoth (Siberian); 2 1/2 tons of seal-whale tusks, &c., and 2 1/2 tons of waste, chips, cuttings, &c., making a total of 104 tons, of which 99 1/2 tons were sold, against 67 1/2 tons offered at the corresponding sales of last year, and of which 64 1/2 tons were sold. The attendance was not large, several of the important regular buyers being absent. Notwithstanding this the sales opened and continued with a firmness of tone more than equal to anticipation. The quantity of newly imported elephant ivory did not much exceed 80 tons, and all sold. More than half of that quantity consisted of ivory from East India, Zanzibar, &c., the greater proportion of which was in the whole tusks, and for the most part hard. The Egyptian was chiefly fair to fine quality, and consisted of Alexandrian and Maltese. The comparative absence of very inferior ivory from Alexandria was regarded as indicative of the supply of such becoming exhausted. The supply from West Coast Africa was quite up to the average, the Niger being extremely good. The Cape ivory was fair on the whole, and the Mammoth exceptionally good in part. The seal-whale tusks were about the same as usual. English and German dealers and manufacturers were the chief buyers. Very little was purchased for French account, and with the American dealers scarcely any sales were effected. The prices realized averaged from \$5 to \$10 per cwt. advance.

New Bridge for the Baltimore and Ohio.—The Baltimore and Ohio Railway Company are about to begin the construction of a bridge at Havre de Grace, Md., at the head of Chesapeake Bay, where the extension of their road from Baltimore to Philadelphia crosses the Susquehanna River. The bridge is to rest on granite piers, which will be founded on the bed-rock by means of pneumatic caissons, sunk after the manner of those at the East River and St. Louis bridges. These caissons are about 30 x 80 feet in area, and are to be sunk to depths varying from 50 to 85 feet below water surface. The grade line will be 90 feet above water, there being no draw. Where crossed by the Baltimore and Ohio the river is over a mile wide, and is divided into two channels by an island. Thus there will, in reality, be two bridges. The longest span is to be 520 feet, and most of the remaining ones 400 feet each.

Steel for Cutting Tools.—C. Reichel, of Berlin, gives the results of many years' observation on the preparation of steel for tools, in the *Zeitschrift für Instrumenten-kunde*: "First, the steel must only be heated to dark red, which is the temperature at which a film of soot burns off. Secondly, the heated articles must be carefully protected from oxidation; hence a flame rich in carbon must be used, and the immersion be done as quickly as possible, so as not to keep it long in the air. Thirdly, water used for hardening must be free from alkalis and carbonate of lime.

The fourth of the series of experiments with the 80-ton gun was carried out at Shoeburyness, England, on November 8. A special target was built up on the range,

consisting of a compound slab of iron and steel, 5 feet square, the iron being 12 inches thick and the steel 6 inches. The huge gun, mounted on an experimental carriage on a line of rails about 200 yards from the target, was loaded with a charge of 450 pounds of prism No. 1 powder and a Palliser projectile weighing 1700 pounds. Only one round was fired, but this demonstrated again that the 80-ton gun is still superior to any armor plating that has yet been submitted to its powers. The 18 inches of iron and steel were not only cut through, but the target, with its 36 inches of oak backing, was completely smashed.

Frederick Ives, of the firm of Ives & Miller, axle manufacturers at Mount Carmel, died at New Haven, at noon, Tuesday, of typhoid fever. Mr. Ives was president of the New Haven Palladium Newspaper Company, and was interested in numerous other business enterprises.

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RECENT BOOKS.

Wahl.—*Galvanoplastic Manipulations. A Practical Guide for the Gold and Silver Electroplater and the Galvanoplastic Operator.* By William H. Wahl, Ph. D. 160 illustrations, 656 pages, large 8vo, cloth; 1883. \$7.50

This volume is based upon Roseleur's (French) treatise, widely known as a reliable and useful work of reference. In addition to the valuable instructions derived from that work, all the more recent and important processes, methods and formulae representing the present state of the art as practiced in the United States have been introduced. The work is divided into three parts, and comprises the electro-deposition of all metals by means of the battery and the dynamo-electric machine, as well as the most approved processes of deposition by simple immersion. The descriptions of the instruments and apparatus used in the art are complete and well illustrated, and the chemical products employed are detailed and their characteristics described. The methods of electrolytizing, nickel-plating, bronzing, tinning, brassing, &c., are discussed at length. A very complete index accompanies the volume, and a full list of American and British patents relating to the subject of electro-metallurgy is given in the appendix. Written in a clear style, and printed in large type, the book will commend itself to the practical mechanic as a thorough instructor and reliable work of reference in every detail and process of the art of electro-metallurgy.

(For Wholesale Metal Prices, See Page 24.)

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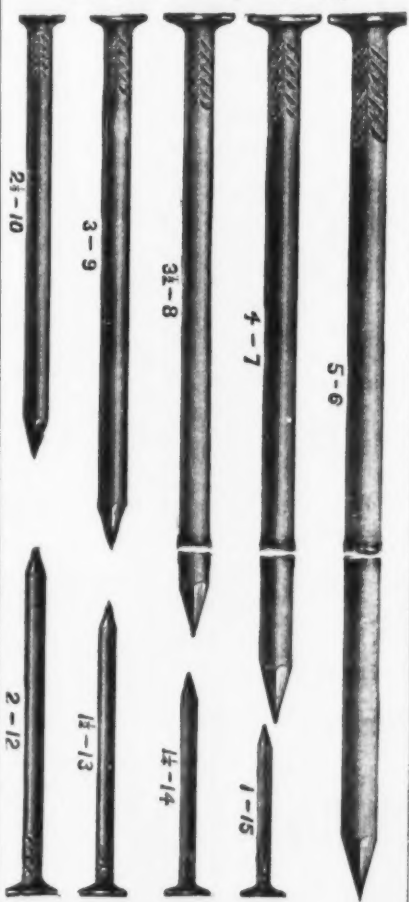
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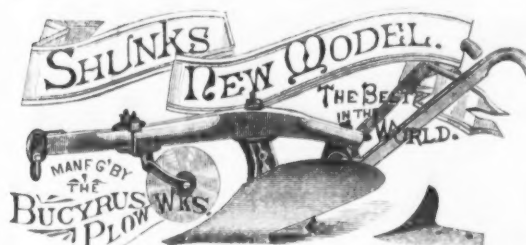


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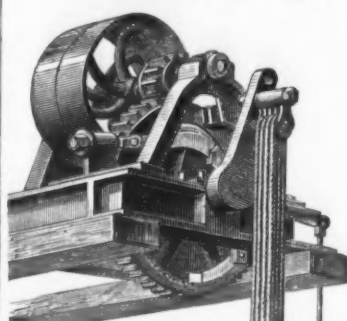
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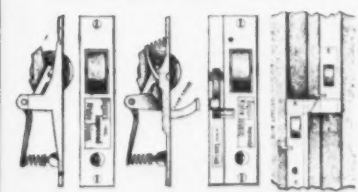
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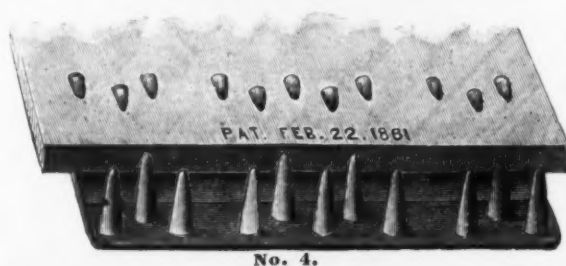
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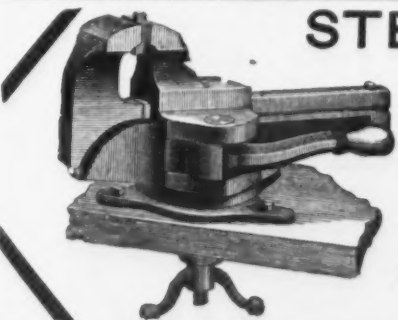
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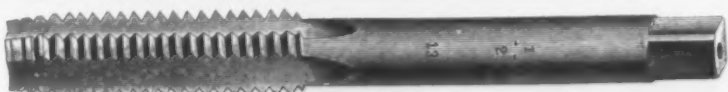
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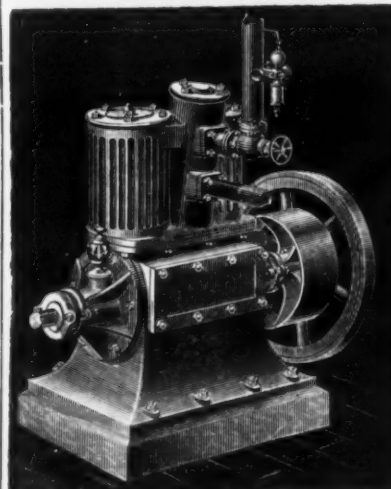
In fact a combination of tools—viz., tree and post-hole digger, transplanting spade, pick and tamping bar. The ease with which the spades are separated (to use one of the spades for filling in the ground, the pick for dislodging stones or other obstruction, or the tamping bar for packing the ground around the post) is a point of great merit. The blades are made of cast steel, and the irons of the best malleable, sufficiently strong to resist all strains. With this digger a man can easily dig a hole thirty inches deep, nine inches diameter, in hard ground, within three minutes. It will work in all soils. No fence-builder, nurseryman, farmer or railroad company can afford to be without it.

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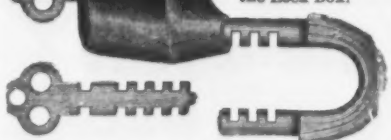
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With Flat Keys.
Shackle secured to
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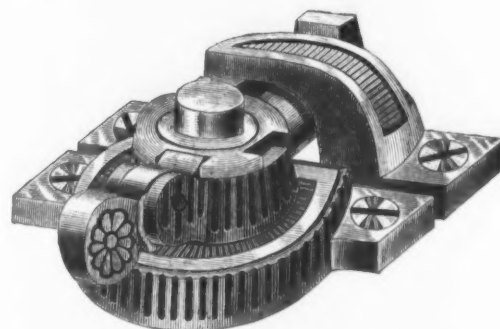
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No Springs to Get Out of Order.

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The improvement in Fasteners for the meeting rails of Window Sashes herein described, consisting of the base-plate provided with a rigid post, the sweep "C" journaled thereon and provided at its inner end with a pivoted latch, having a forwardly-extending arm which engages with a rigid notched or shouldered flange or plate, at the top of the post above the sweep, to lock the latter as described. Having lately secured of the United States Patent Office the above claim, and as it does not in the least infringe the rights of the Morris Sash Lock Manufacturing Co., we shall hold the said parties responsible for all injury done our business by them, and shall protect our customers to the fullest extent against all claims of infringement by said Morris Sash Lock Manufacturing Co.

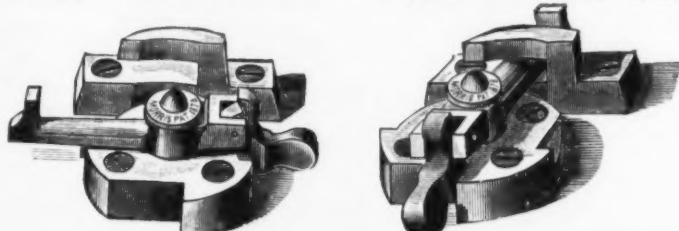
Try our Gravity Sash Locks, as they are the best in the world.

THE KEMPSHALL MFG. CO.,

September 17, 1883.

New Britain, Conn.

THE MORRIS SASH LOCK,



MANUFACTURED BY

THE MORRIS SASH LOCK MFG. COMPANY,

MANUFACTURERS OF

SPECIALTIES, BUILDERS' HARDWARE,
Cincinnati, Ohio.

SPECIAL NOTICE TO THE HARDWARE TRADE.

When we published our Circular to the Trade in August last, in reference to the Kempshall Gravity Sash Lock, no patent had been issued to the Kempshall Company. But to our surprise the Patent Office last month granted them a patent, under which they are claiming the right to make their Fasteners.

The application for this patent was made by one William E. Sparks, and we ask the Trade to note that the Patent Office, in acting upon it, wrote an official letter, on the 18th of last July, rejecting it on one Mr. Morris' patent of 1879, and saying:

"Morris, 22,487, Feb. 18, 1879, shows a Sash Lock which in every respect is equivalent to that shown and described in this (Sparks') application. It is considered a matter of no consequence that the latch engages with the notch in the bottom plate instead of a top plate, and it is held to be immaterial whether the locking notches are above or below the latch."

As the Patent Office in July thought the Kempshall Fastener the equivalent "in every respect," as they say, of the Morris Fastener, it will not be wondered at that we were surprised they should in September grant a patent for it.

We have determined to test the right of this Sparks-Kempshall patent to continue in existence, and we have therefore this week brought another suit against the Kempshall Company, under Section 4918 of the United States Revised Statutes, to have the patent declared void by the court, as being for substantially the same thing as our Mr. Morris' prior patent.

The Trade therefore will please take notice, and are respectfully requested to await the result of the litigation before being influenced by the Kempshall patent.

Cincinnati, November 1, 1883. THE MORRIS SASH LOCK MFG. CO.

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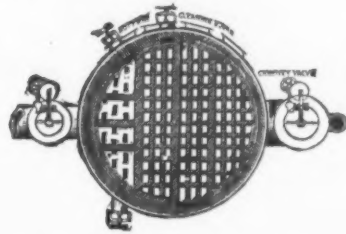
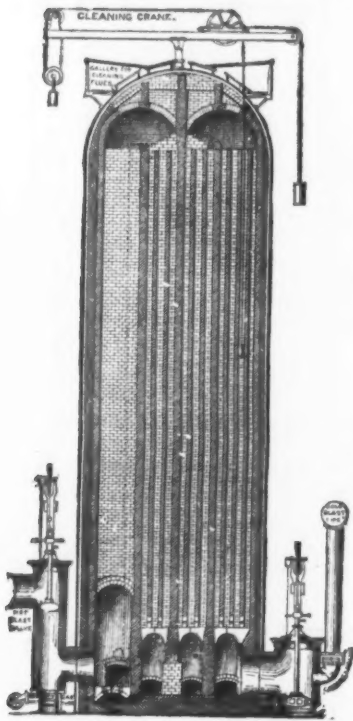
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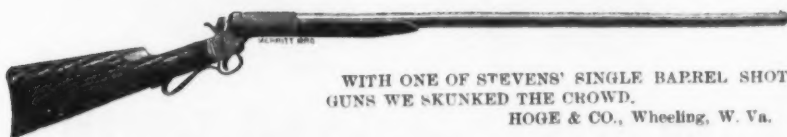


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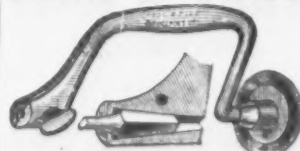
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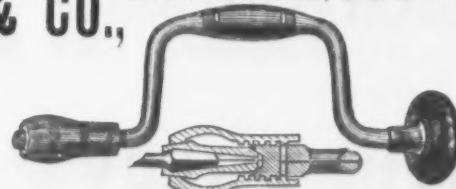
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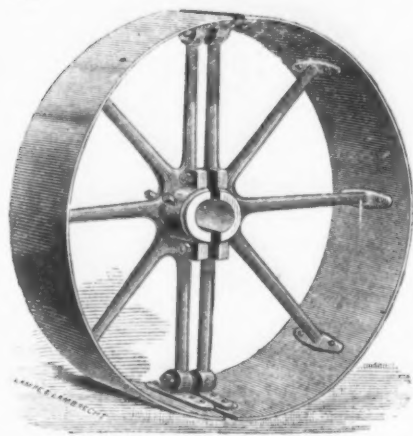
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No. 80..... 8 " "
No. 90..... 9 " "
No. 100..... 10 " "
No. 110..... 11 " "
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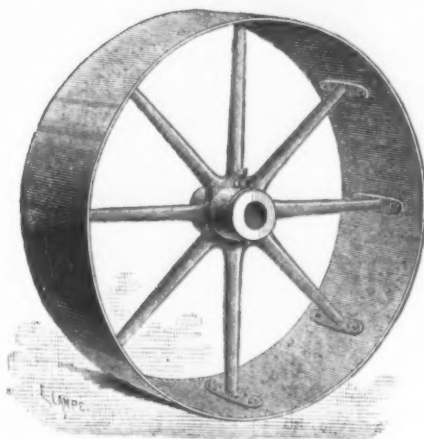


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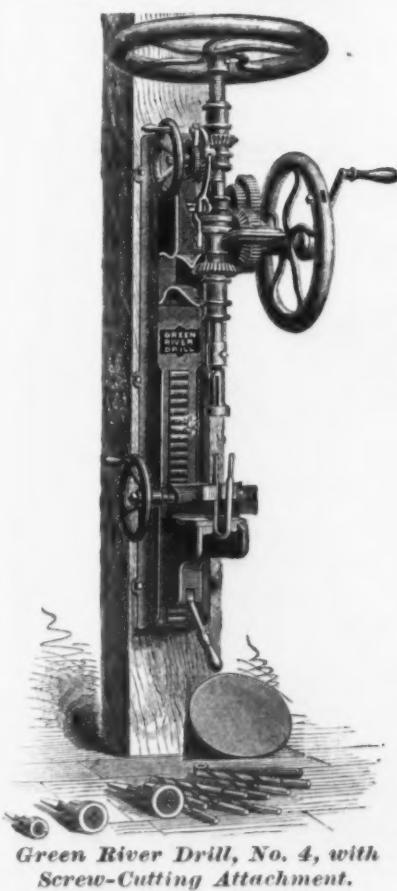
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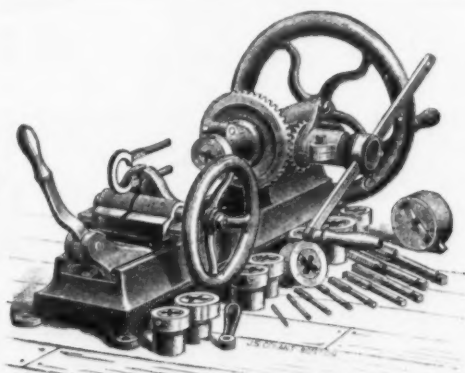
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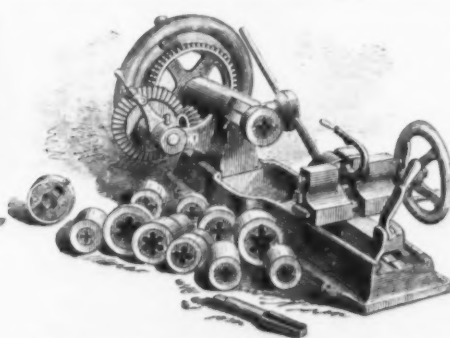
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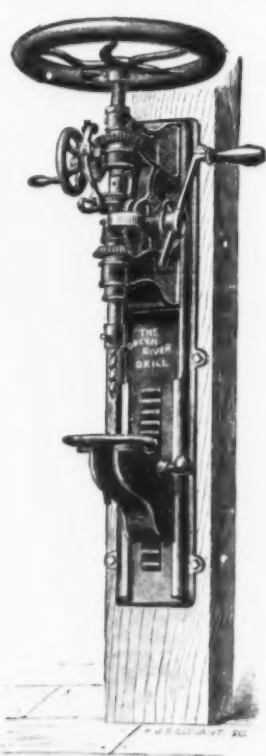
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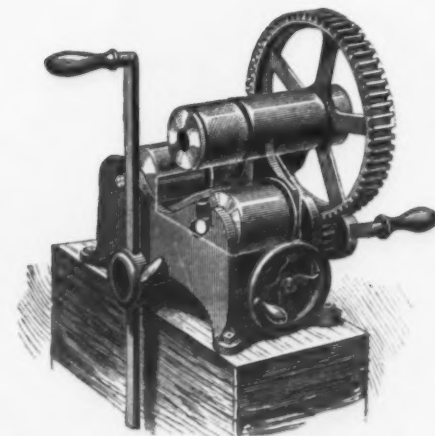
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A Vice and Steel Dies expressly for Welding
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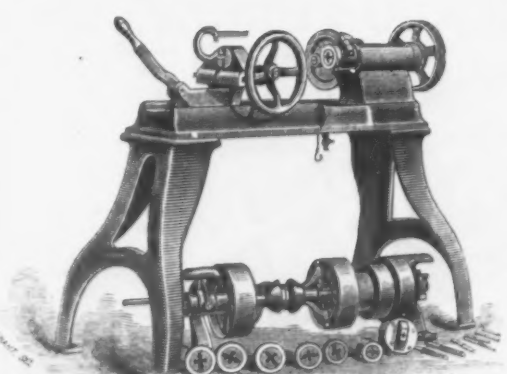
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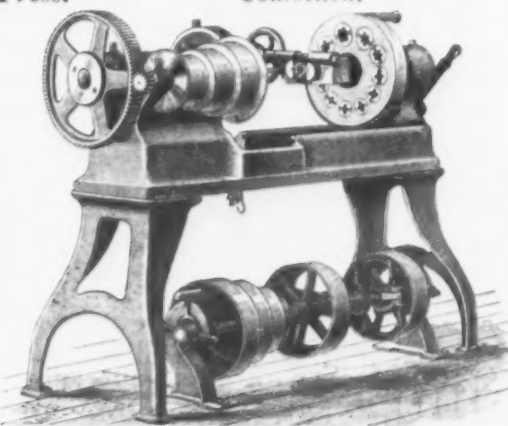
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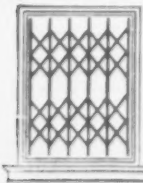
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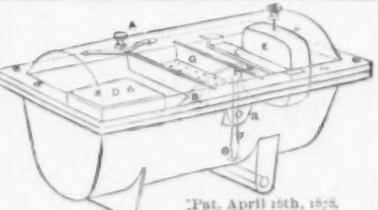
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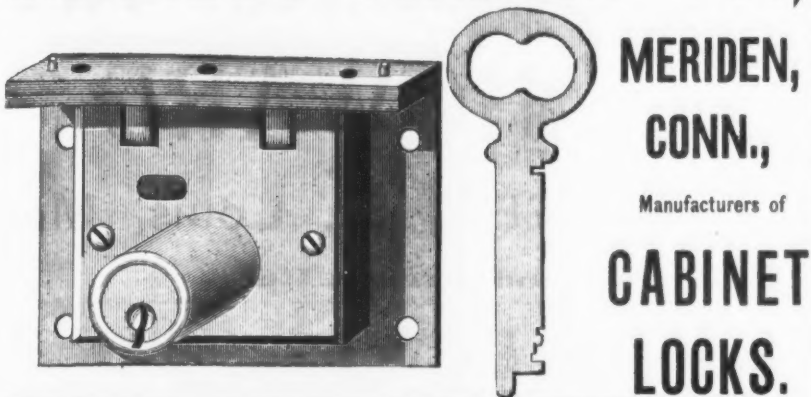
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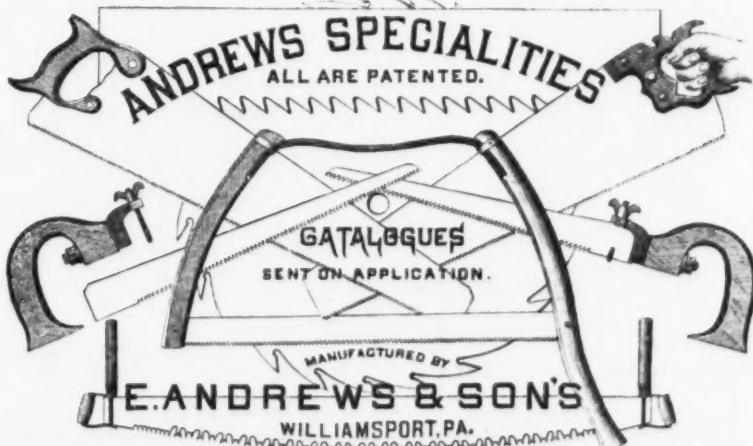
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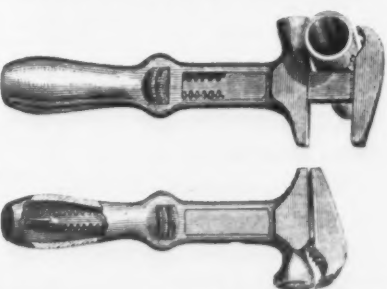


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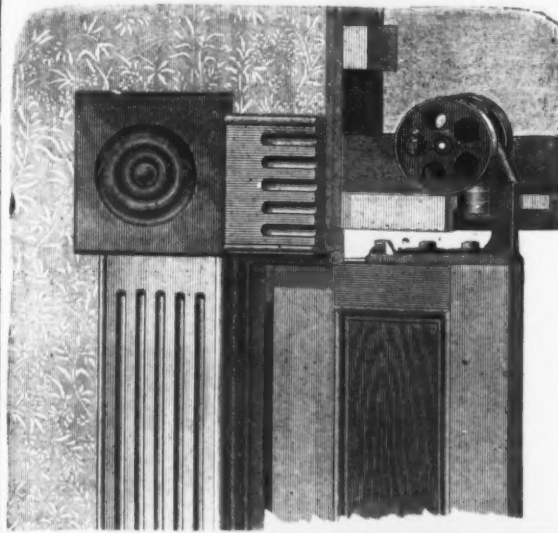


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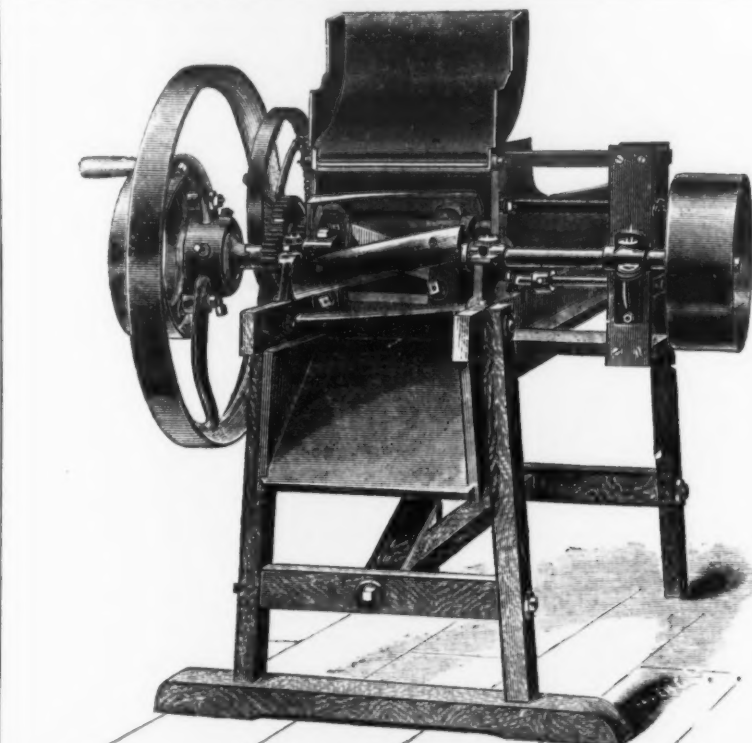
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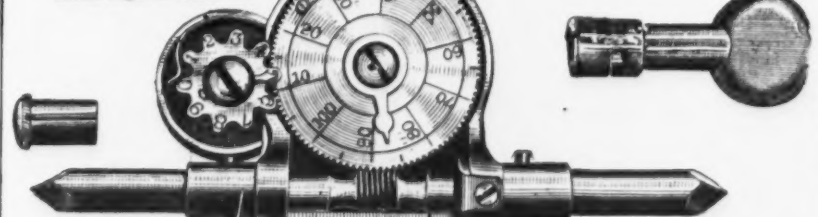
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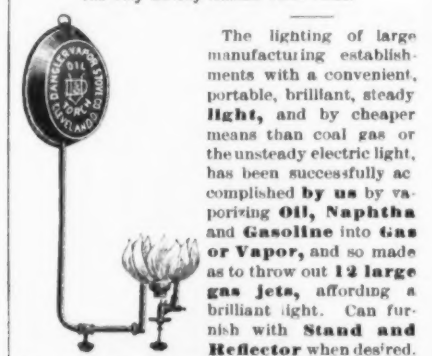
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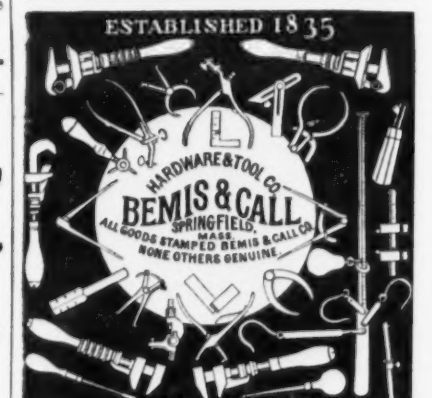
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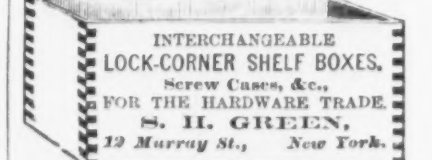
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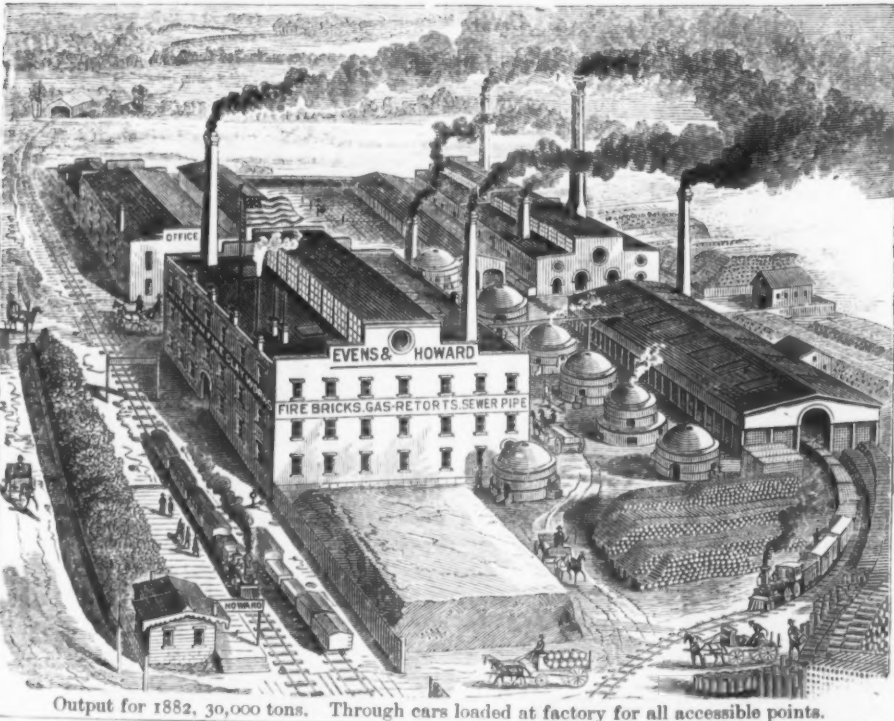
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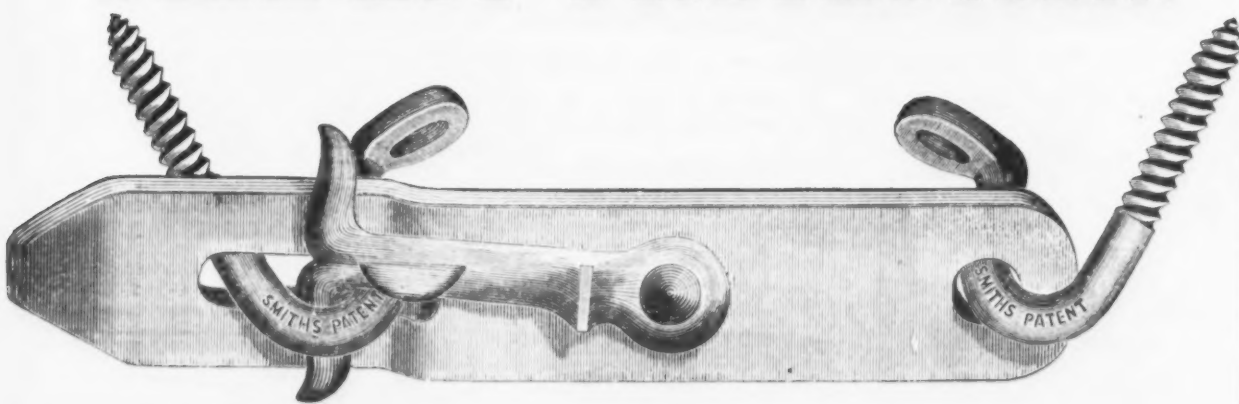


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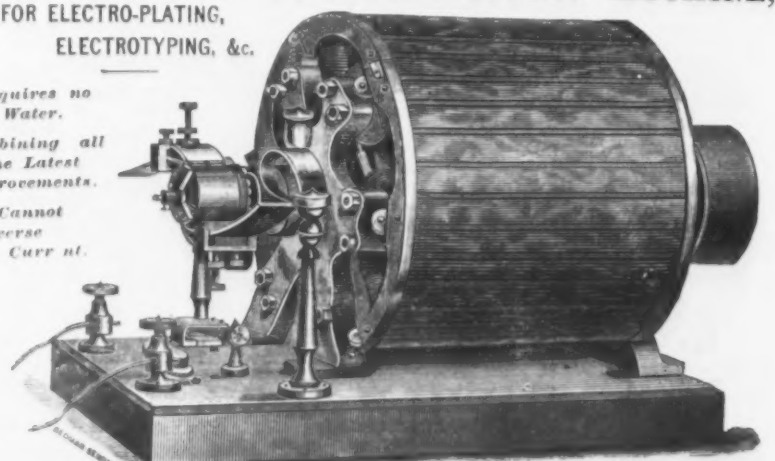
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Merrill Bros. & Co., Chicago, Ill. 40

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Heartley Geo. W., Toledo, O. 59

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Cooke & Co., 22 Cortlandt, N. Y. 36

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Maddux O. W., 27 Park Row, N. Y. 16

Stillman & Co., Cincinnati, O. 16

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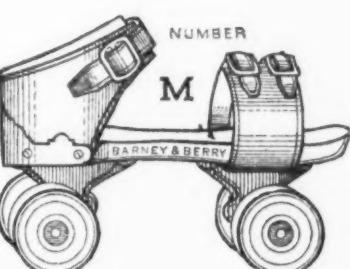
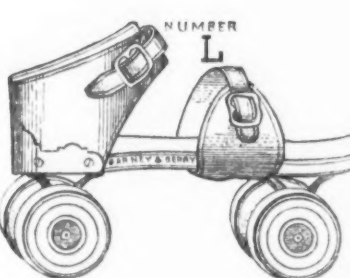
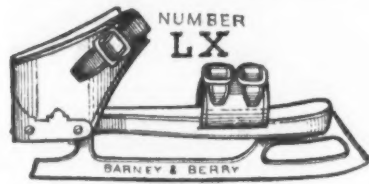
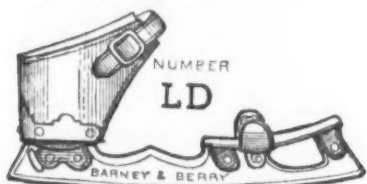
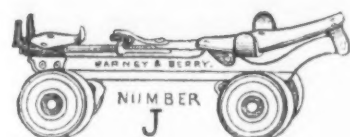
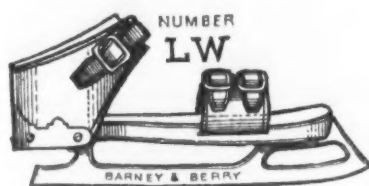
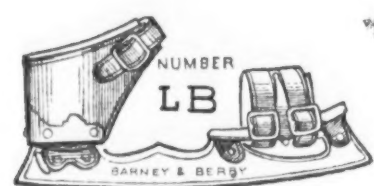
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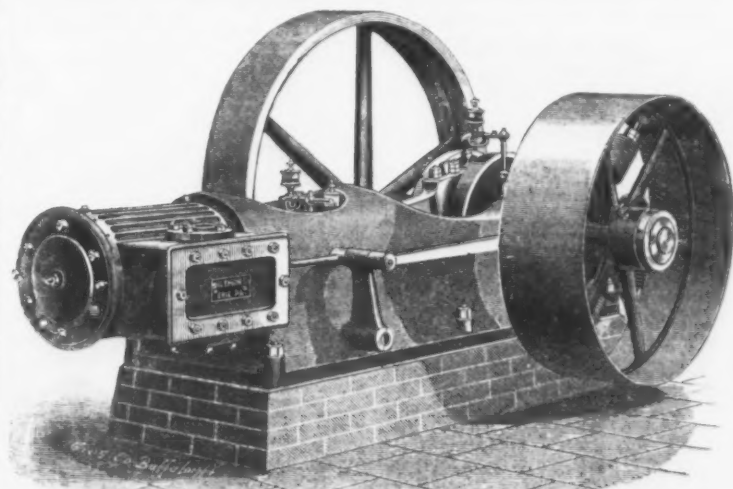
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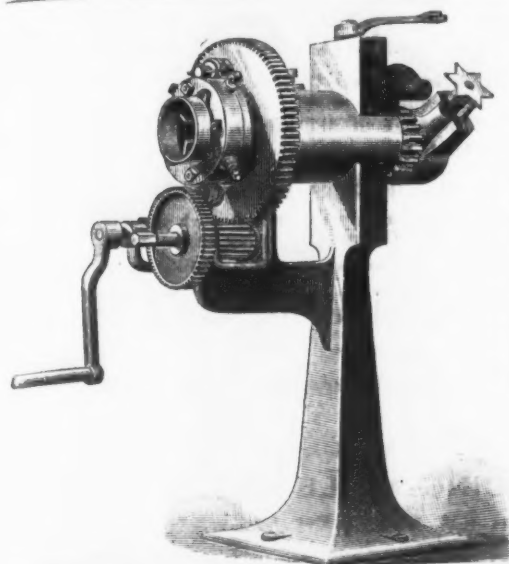
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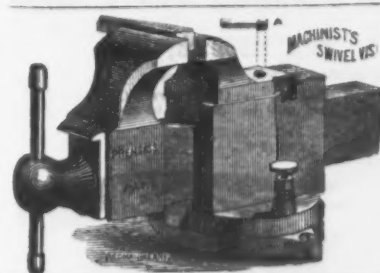
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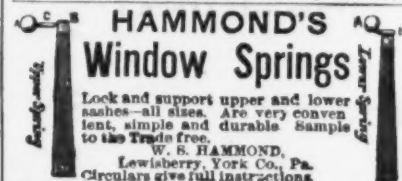
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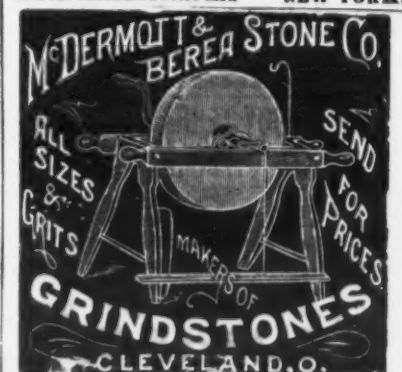
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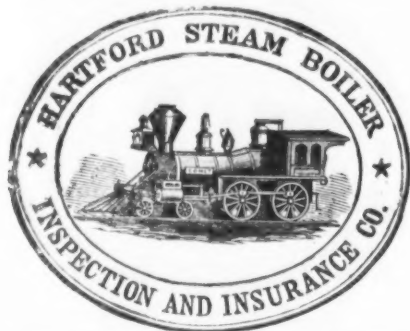
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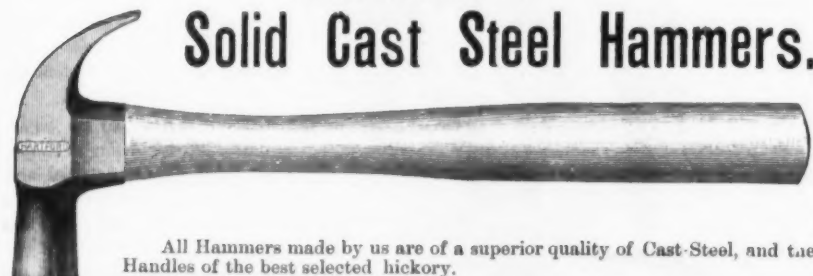
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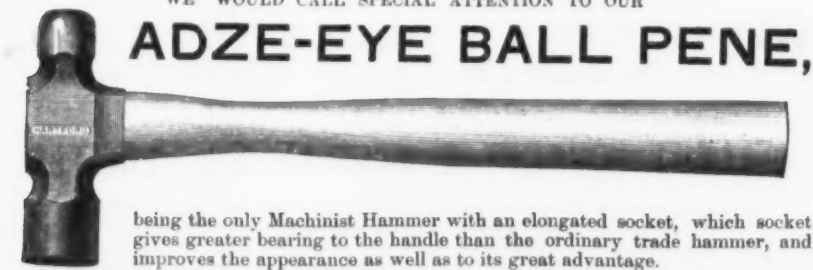


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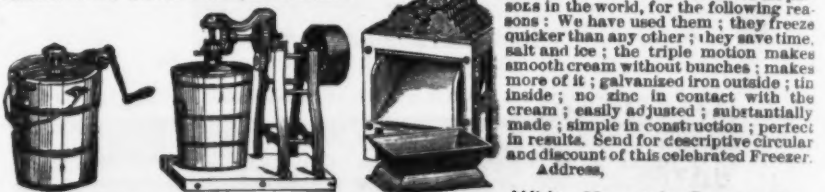
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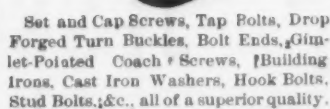
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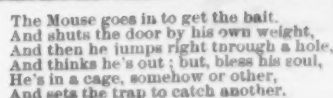
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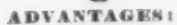
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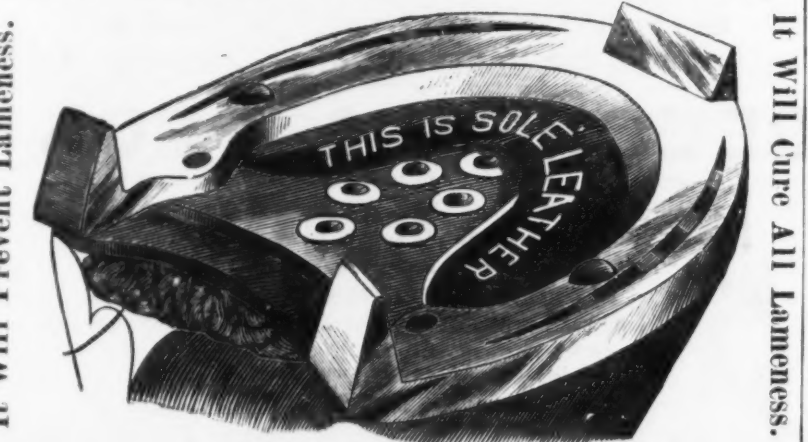
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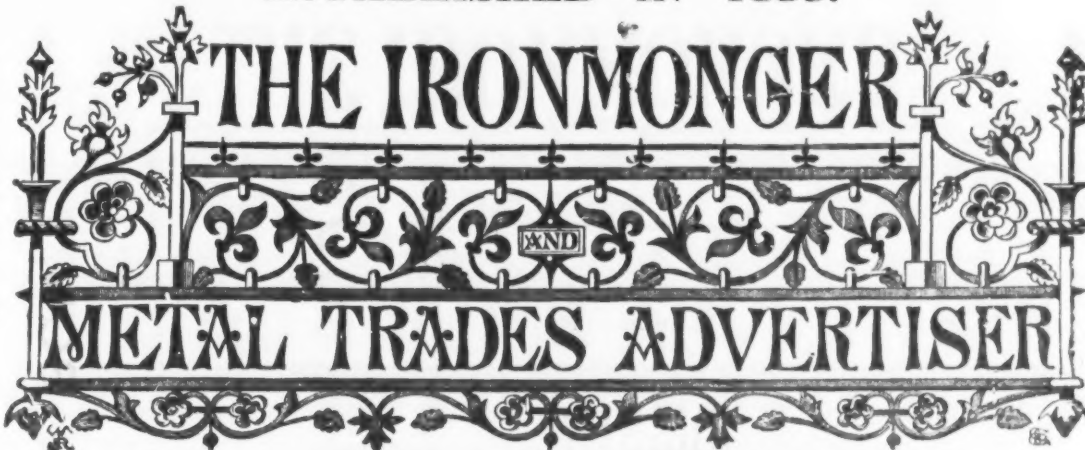
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so far as our experience of more than twenty years is concerned, will be covered by THE FOREIGN SUPPLEMENT at least twice a year. Thus a Price List or Advertisement inserted in the Ironmonger and FOREIGN SUPPLEMENT is a strikingly powerful and most efficient way of publicity, not to be compared with any of the other ordinary channels of communication.



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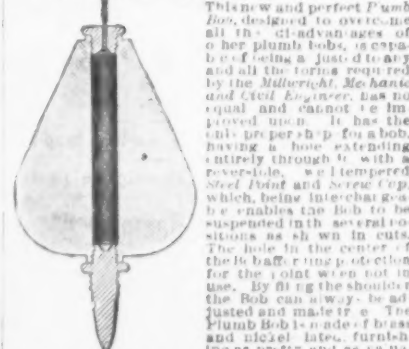
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This new and perfect Plumb Bob, designed to overcome all the disadvantages of other plumb bobs, is especially useful in justifying and all the lines required by the Millwright, Mechanic and Civil Engineer. It is so equal and cannot be improved upon. It has the only proper shape for a bob, having a hole extending entirely through it with a reversible, well-tempered Steel Point and Screw Cap, which, being interchangeable, enables the bob to be suspended in several positions as shown in cuts. The hole in the center of the bob baffles the air, and for the joint when not in use. By fitting the shoulder the Bob can swing, be adjusted and made true. The Plumb Bob is made of brass and steel, and is furnished in two sizes, 2 and 4 lbs. A liberal discount to the trade. Send for Price List. Manufactured by VAJEN & NEW, Indianapolis, Ind. For Sale by all Hardware and Tool Merchants.

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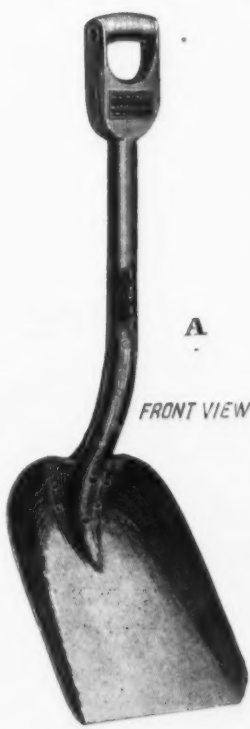
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No Straps to catch; no Straps to interfere; no Straps to tear off.

We use Best Materials Only in their manufacture, and fully warrant every Scoop. For Price Lists, &c., apply to

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Scoop bowl pressed from one solid piece of Cast Steel. Style A has Solid Front strap.



FRONT VIEW



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Patent Back-strap, which is completely below the line of wear, adds to the strength of the Scoop-bowl and gives support to the handle.

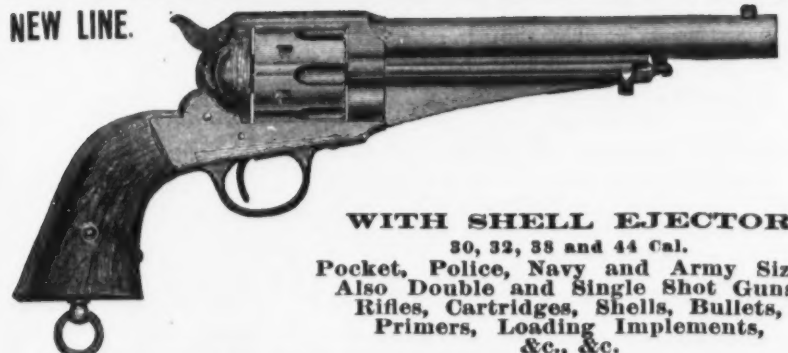
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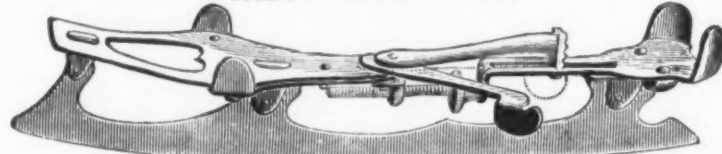
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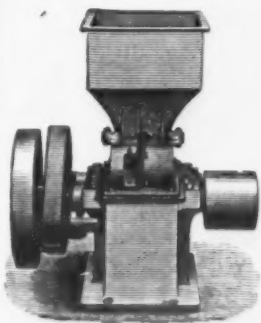


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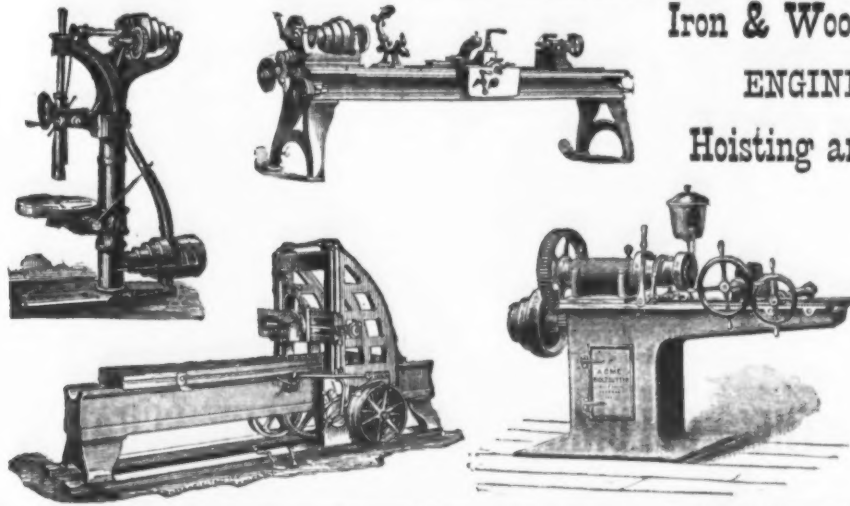
L. M. RUMSEY MANUFACTURING CO., THE REIHER SELF-LOCKING

ST. LOUIS MO.

Iron & Wood Working Machinery,

ENGINES AND BOILERS,

Hoisting and Pumping Engines.



MACHINISTS' TOOLS.

Lathes, Planers, Shapers, Drill Presses, Gear Cutters, Bolt Cutters, Milling Machines.

CHUCKS—Lathe, Planer and Drill.

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CANTON TOOL STEEL.

TRANSOM LIFTER

A represents the Stationary Locking Bar; B the Self-Locking Adjusting Block; C the Operating Rod; D the Lower Bracket; E the Lifting Arm; F the Transom bracket.

With this Adjustable Locking Bar and Lifting Arm, the opening of the transom can be made larger or smaller without the least inconvenience.

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[Catalogues furnished on application.]

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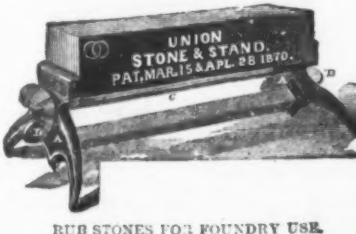
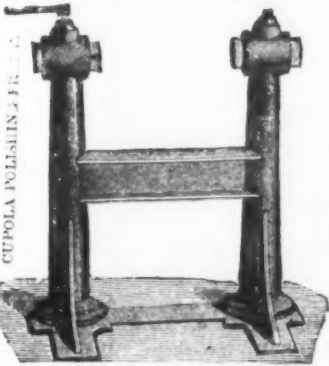
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EMERY, QUARTZ, CORUNDUM.

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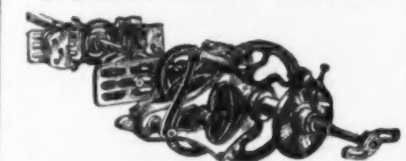
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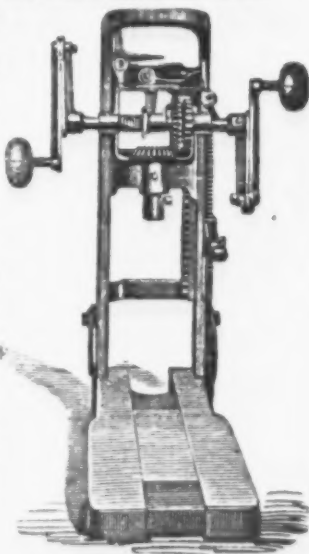
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are universally acknowledged to be superior to all other Boring Machines, and we guarantee to give better satisfaction than any other machine. We claim for our machine, and we guarantee all that we claim: First, that it will bore any size hole in any material in the same length of time, with greater ease, than any other machine; second, that it will regulate the size of the hole to the size of the same, or to a size the operator will drive the bit any required speed; and the bit or auger returns from the hole by the same automatic motion with which it entered, leaving the hole entirely free from chips; it is gauged to bore such a depth as may suit the operator, once two or more holes at exactly the same depth after being once set, without any attention from the operator; it is an angle machine and will bore on any angle; it is the most compact machine; it can be placed in a small compass as to occupy but little room in a carpenter's tool chest, and while in this compact form it can be carried in the hand with the greatest ease and convenience; it is the most durable machine, from the fact that we use the best material in its construction and each part can be duplicated in case of accident to send directly to us. We finish the ironwork with a baked or heated Japan finish which enables it to withstand all kinds of weather, the woodwork being rubbed in oil and shellacked. They are the cheapest in the world for what they can do. We are introducing the Glavin Improved Auger in connection with this machine. This auger is the best Boring Machine Auger made, being self-clearing in gum, or knotty wood. We offer the lower, boxed and delivered on board cars, for \$6 with full set Glavin Improved Augers, 15 qrs. \$9; or with extra finished beds, \$6.50, and full set augers, 15 qrs. \$9.50. A discount given for large orders. Send for descriptive Catalogue.



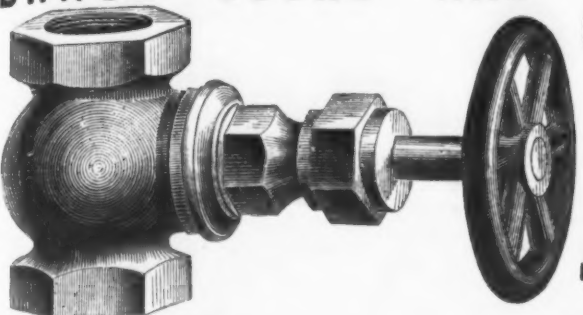
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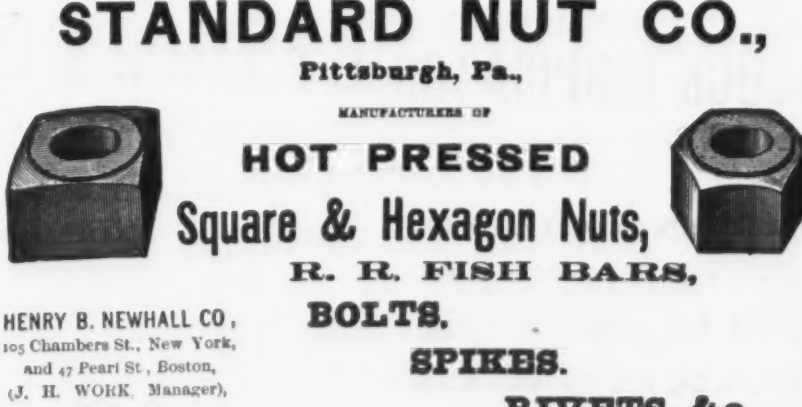
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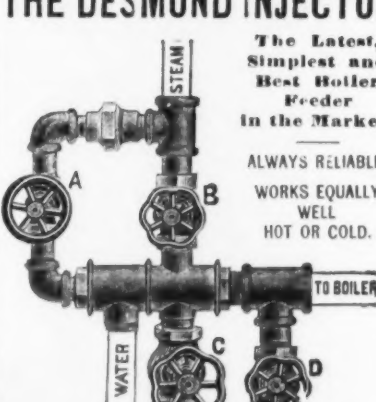
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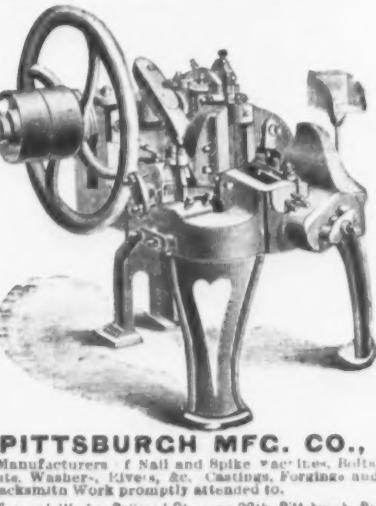
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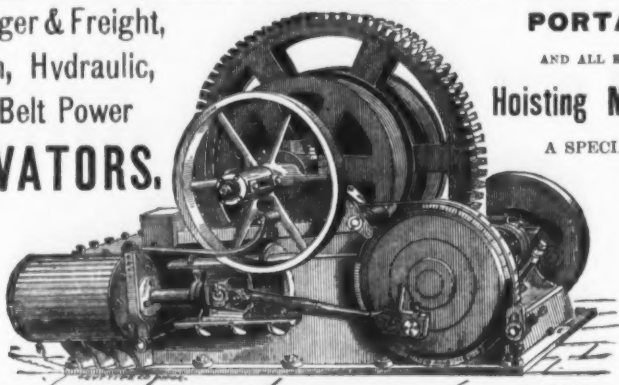


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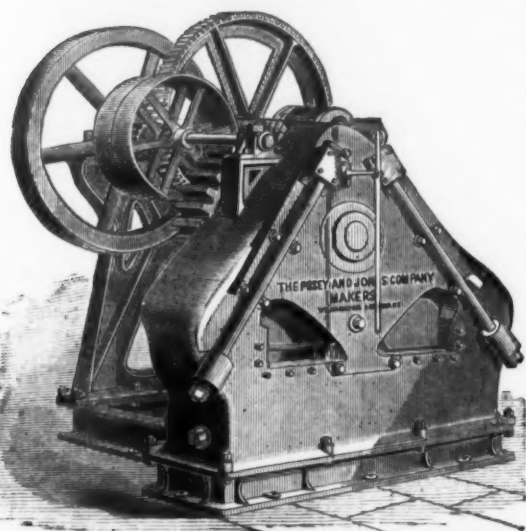
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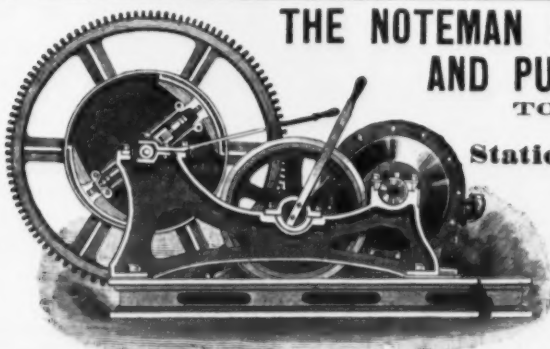
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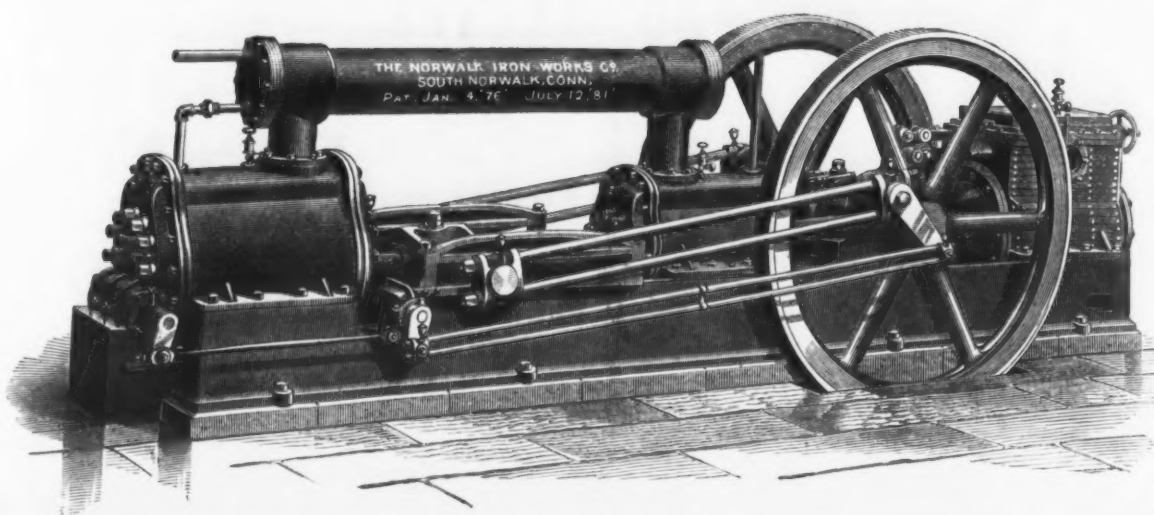
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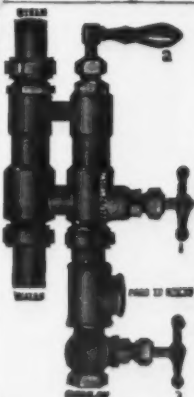
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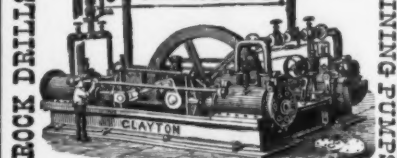
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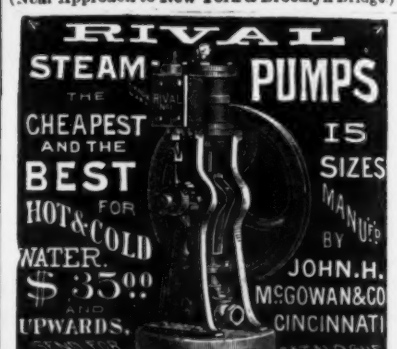
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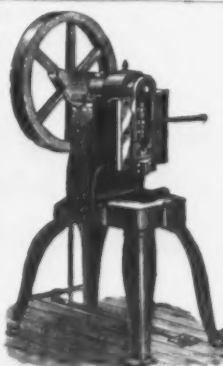
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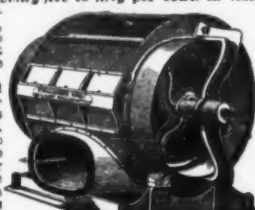
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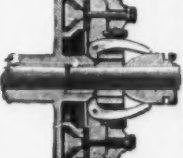
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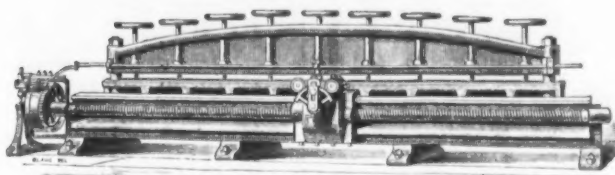


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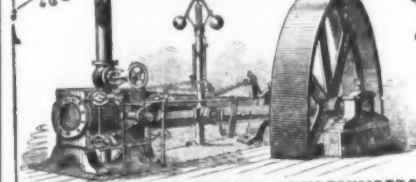
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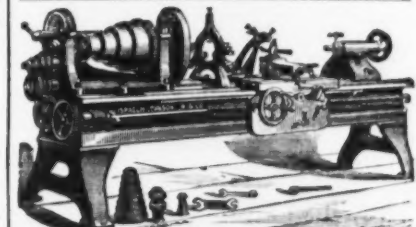
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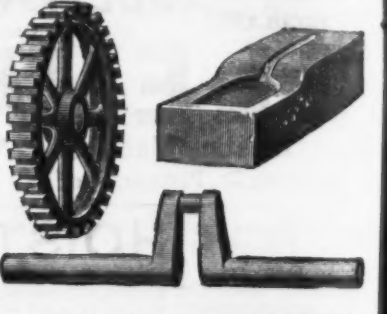
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